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## Practical Therapeutics


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# Original Articles

## The Cerebrospinal Fluid—Spinal Drainage—Intraspinal Therapy


BY FRANCIS X. DERCUM, M.D.

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In a paper on the functions of the cerebrospinal fluid read before the Philadelphia Clinical Association in December, 1919,[1] the writer after a full consideration of the chemical composition of the cerebrospinal fluid, of its hydrostatic properties, of its distribution, sources, and exit, of its relation to the vascular and lymphatic systems and of other cognate factors, presented a number of conclusions, among the more important of which are the following:

"First, the cerebrospinal fluid is preëminently a fluid for the hydraulic suspension of the brain and cord; its function is essentially hydrostatic.

"Second, its chemical constitution is essentially that of the innocuous three-quarter per cent common salt solution of the histologic laboratory. It has no action on the tissues with which it comes in contact: it is absolutely neutral and negative.

"Third, it is distributed through the ventricles and subarachnoid spaces. It has no relation to the perivascular, pericapillary, or perineuronal spaces.

"Fourth, it possesses no function of and plays no rôle in nutrition. The nutrition of the brain and cord takes place as does that of the other tissues, through its blood-vessels, the perivascular spaces playing the same rôle as do the perivascular lymph spaces in the other organs and tissues.

"Fifth, the cerebrospinal fluid has its source in the choroid plexuses and perhaps in the general serous surfaces of its containing cavities. It leaves the subarachnoid spaces of the cranium by passing through the arachnoidal villi into the venous current of the sinuses; also to a less extent by the lymph sheaths of the cranial nerves; from the spinal subarachnoid space it passes out by the lymph sheaths of the spinal nerves."

My object in again calling attention to these conclusions is because of the bearing they have upon the questions of spinal drainage and spinal therapy generally. Without pausing to go into details, it will I think be admitted that the pressure of the cerebrospinal fluid is dependent among other things upon the rate of its formation and the rate of its escape from its containing cavities. Its passage through the villi of the arachnoid and the lymph sheaths of the cranial and spinal nerves prevents under normal conditions an undue increase of pressure. Should, however, the pathways of exit become obstructed, a rise in pressure must inevitably follow. Such a rise of pressure is the rule both in paresis and tabes, and it seems quite logical to refer this rise to the obstruction of the outflow—

[1] *Archives of Neurology and Psychiatry*, March, 1920, vol. iii, pp. 230-251.

the resorption — normally taking place through the arachnoidal villi and the lymph sheaths of the nerves. The inflammatory involvement of the membranes present in both paresis and tabes abundantly accounts for the occlusion of these avenues of exit.

Pathological increase of pressure must necessarily interfere with the nutrition of the cord. Normally there is doubtless a balance between the pressure in the blood-vessels within the cord and the pressure of the surrounding cerebrospinal fluid. The dura being a closed and inelastic sac, it follows that if the pressure of the cerebrospinal fluid is abnormally increased, the vascularity of the cord must be correspondingly diminished; less blood than normally will be able to enter its vessels. If, on the other hand, the pressure of the cerebrospinal fluid be diminished, there must ensue an increase in the vascularity of the cord. It is probable that the rapid withdrawal of the cerebrospinal fluid, as in spinal drainage, is followed by a relative hyperemia of the cord, and, other things equal, of the brain as well. The results of spinal drainage are doubtless in part to be attributed to the improved nutrition which follows this increased vascularity. But most important of all, practiced immediately after the intravenous injection of arsphenamine, spinal drainage undoubtedly favors the diffusion of the remedy through the walls of the capillaries into the nerve tissue. The presence of the arsenic has been noted in the cerebrospinal fluid by Benedict,[1] Sicard and Bloch,[2] and by Kopke.[3] It could only have gotten there by passing through blood-vessel walls. All things considered, therefore, the indications for spinal drainage are definite and clear.

The statement made by Boudreau[4] that the drainage method is not without danger, and is extremely painful, is to be met by the following facts: First, in every case of spinal tapping, *i. e.*, spinal tapping merely for ordinary serological study, the clinical diagnosis should first exclude brain tumor and brain abscess; and in every case in a *first* spinal tapping only so much spinal fluid as is absolutely necessary for the serological study should be removed. This precaution should be practiced even in a well-recognized case of tabes or paresis as well as in one which is merely suspected. Secondly, the diagnosis having been established, free drainage can and should be practiced, associated, as above described, with the intravenous injection of the arsphenamine. Many thousands of such drainages have been practiced in the neurological department of Jefferson Hospital and, it should be added, without danger.

Furthermore, the statement that the procedure is extremely painful is entirely at variance with the experience at my clinic. The pain of the introduction of the needle, such as occurs in every spinal tapping, is present, but no more than this; and as regards the headache that is at times observed after ordinary spinal tapping, this is notably absent in cases of tabes and paresis. Indeed, when headache follows a spinal tapping we have come to regard it in my clinic as indicating that the case is not one of tabes or paresis. In the latter only one result follows, and that is relief of pain and distress and improvement of symptoms generally.

The attempt to treat the central nervous system by means of intraspinal injections of arsphenaminized serum and similar procedures which aim to utilize the cerebrospinal fluid containers are, in my opinion, unscientific, for the following reasons: First, the facts indicate beyond question[1] that the nutrition of the central nervous system does not depend upon the cerebrospinal fluid but upon the blood supply; it takes place through the capillaries. Further, substances introduced into the cerebrospinal fluid rapidly disappear, passing

[1]Sachs, B.: On the Intravenous, Not the Intraspinal, Use of Arsphenamine in Syphilis of the Nervous System. *Arch. Neurol. and Psychiat.*, 1:277 (March), 1919.

[2]Cited by Mestrezat, William: Le lequide cephalorachidien normal et pathologique, Paris, A. Maloine, 1912, p. 93.

[3]Cited by Mestrezat, p. 93.

[4]Present Opinion on Intraspinal Therapy in Neurosyphilis. *Medical Record*, Sept. 24, 1921, p. 539.

[1]Dercum, *loc. cit.*

through the arachnoidal villi into the venous system without entering the parenchyma of the central nervous system in the slightest degree; the cerebrospinal fluid is already on its way of exit.

If arsphenamine acts at all when introduced in simple solution into the spinal subarachnoid space, it is by irritating and inflaming the spinal membranes, and, in a variable degree, the other spinal contents. This is the legitimate inference to be drawn from the experience of Paul Ravaut[1] and of others; unless the arsphenamine has been used in such small amounts as to be under any circumstances practically valueless. These conclusions doubtless apply with equal force to the introduction of corrosive sublimate and other antisyphilitic remedies via the subarachnoid route.

I am, of course, well aware of the claims made in behalf of the Swift-Ellis and allied methods, especially in the treatment of tabes, of spinal syphilis of the exudative form, and to a less extent of paresis. For a long time I made use of this method most extensively in my clinic and in my private work, and I can confirm the claims made as to undoubted improvement in tabes and spinal syphilis, and of apparent improvement from time to time in paresis. I have, however, for several years past come to the conclusion that the improvement does not depend on the intraspinal injection of the arsphenaminized serum, but on the incidental drainage of the spinal subarachnoid space which must inevitably be practiced before the injection is made. This has been confirmed by the experience in my clinic, in which the practice is limited to radical spinal drainage alone and the results of which have greatly exceeded those of any other method.

Finally, the late Thomas B. Earley and myself treated in my service a number of cases by intraspinous injections of *unsalvarsanized* serum, the serum having been prepared and inactivated in the usual way without the previous intravenous injection of salvarsan. To our great surprise this method was followed by a fall in the lymphocyte count and the patients themselves also showed improvement. Here the results were evidently again to be attributed to the incidental spinal drainage.

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# Some Suggestions for Alleviating the Pains of Labor

BY J. WALTER LAYMAN, M.D.
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Of late years much has been written about the so-called "twilight sleep." The method of procedure seems to be pretty generally condemned by the big schools and defended by some isolated practitioners. I will not discuss very fully its advantages and disadvantages for the reason that it has been very generally discussed many times. One outstanding fact remains, and was emphasized by the manner in which "twilight sleep" was hailed by women generally, and that is that womankind is reaching out for relief of pain in childbirth. Being regarded by most people as a physiological process, little attention has been given the relatively unimportant matter of pain from the standpoint of the physician. To the physician the matter of pain is incidental. The all-important thing is the welfare of the mother and child.

Any progress to be made in the relieving or alleviating some of the distress of labor must have for its first principle the safety of the mother and health of the child. I have used the "twilight sleep" and have written of its application. In my hands I have found it a safe procedure, and successful to a varying degree. In

[1]Ravaut, P.: *Ann. de méd.*, 1:49, 1914.

some cases it left little to be desired, while in others the restlessness and delirium of the patient made it a thing of alarm to relatives and attendants. The actions of the scopolamine simply cannot be foretold nor controlled. For these reasons I have practically discontinued the use of scopolamine in obstetrics.

I have worked out a procedure which might almost be called a technique. Its use employs no new or untried drugs, but is rather a combination of well-known agents whose action is fairly definite.

I believe it is still good practice to go to an obstetrical case when called, and to examine the patient when you get there. Having observed surgical cleanliness in your examination, and having decided that there is no serious obstruction or malformation which would preclude the possibility of birth by the natural outlet, you may have found the cervix thinned out, and it will possibly admit the examining finger. The pains are severe, the cervix somewhat rigid. You are sure your patient is in labor, and you introduce under the skin with the hypodermic needle from 1/6 to ¼ grain of morphine sulphate, combined with atropine, if you like. The progress of labor will not be arrested (in the great majority of cases), but the patient will experience relief from the agonizing pains, and if she has been in labor for several hours she will be very grateful and will lapse into sleep between pains. As they often express it, "the sharp edges are taken off." The patient is allowed to go on in this manner until the cervix is about two-thirds or more dilated. If the occasion demands, an additional dose of morphine, gr. ⅛, may be given, rarely ¼, if necessary to control the pain.

At this time, when the cervix is well dilated (two-thirds or more), and in the absence of mechanical obstruction or disproportion of the bony parts of the child, and the presenting part, the head (for I have never used pituitrin in breech presentation), is well down on the pelvic floor, I prepare the patient for light chloroform anesthesia. I say light anesthesia and am careful of its administration, for this is a very important part of the technique. It may seem useless to many to dwell on this one fact, but there are some men even today who give chloroform by placing a piece of cotton in the bottom of a glass, saturating the cotton with chloroform, and holding the glass over the patient's nose. It is important to always use an open chloroform mask, covered with about four layers of gauze. Between the middle layers may be placed one small piece of cotton to act as a sort of reservoir, and prevent dripping in the patient's face. I always hold the inhaler just so it does not touch the face, and this insures a plentiful supply of air. The patient's face is covered with vaselin or some other greasy substance, and the anesthetic started.

When anesthesia is almost complete, I leave the administration, or at this time the holding of the inhaler, to the nurse or some one else and prepare to watch the progress of labor. In many cases the expulsive efforts of the uterus will be arrested by the chloroform. In other cases the progress of the labor is greatly accelerated by the administration of chloroform (this I believe to be due to the abolition of conscious restraint on the part of the patient to the effort at labor). Care should be used here so as not to produce a profound anesthesia. In case the progress of labor is arrested by the anesthetic, I prepare for administration by the hypodermic needle from ½ to 1 Cc. of pituitrin (P. D. & Co.). Many times ½ Cc. will do as well as 1 Cc., and in some cases it is necessary to use repeated doses every half-hour until physiological contraction of the uterus is begun under the anesthetic. I have given as much as 4 Cc. of pituitrin in a single case, and have known of as much as 15 Cc. to have been used. It is a question of action and not dosage. I give chloroform before the pituitrin for the reason it is impossible to anesthetize the patient if the pituitrin precedes the chloroform before violent pains take place. Now with the chloroform and mask in another's hands, with close supervision on the part of the

doctor, and instructions to drop, drop, drop the chloroform, not poured; to hold the inhaler just so it does not touch the patient's face, and to withdraw it altogether the moment she shows signs of deep anesthesia and allow the pains to slightly arouse her, the physician can keep a close watch on the anesthetic, but keeps his hands clean and free to watch and assist in delivery of the child.

I think with a little practice and care many physicians would make this a procedure of choice. I do not know exactly how many cases I have had in which the above outlined procedure was used, but it is well over two hundred, with no maternal mortality, and only one fetal death, and that not chargeable to the method of delivery.

Obviously this treatment is not applicable to all cases. Some will be delivered by themselves before the doctor arrives, others are those who have had four to six previous deliveries and will think of nothing else but "grin and bear it," while others will be found who have a mortal fear of any sort of an anesthetic and will suffer agony rather than submit to it. In the large majority of women, however, if carefully explained to them, it will be gladly welcomed and they will be very grateful; the doctor will feel not only that he has earned his fee, and that "nature's course" was not greatly violated, but that he has actually assisted in and greatly lessened the ordeal by which all women suffer to bring to them the full fruits of life and to justify their existence.

I am convinced that there is no more need of, nor any more justification in allowing, a woman to go on and suffer agonizing pains during childbirth than that there is for a surgeon nowadays to operate without some form of anesthesia. As soon as women learn that a great deal of their suffering incident to labor is unnecessary they will demand from the profession that they shall have this ordeal made as nearly painless as possible.

A woman coming through a delivery by the near-painless route recovers more quickly, and is not nearly so exhausted and fatigued as when left to herself. A tremendous saving of strength has been accomplished, aside from the fact that labor has been made more endurable.

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# The Clinical Importance of Infected Bronchial Lymph Nodes

BY H. A. HARE, M.D., LL.D.
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In this brief paper I desire to call attention to the bronchial lymph nodes as factors which should be considered in the study of persons suffering from cough and loss of weight and strength from an unexplained cause. These nodes are also to be considered in cases of asthma, particularly that form which begins after some attack of pulmonary infection.

It is remarkable how little attention has been paid to these tissues by the general clinician, the more so as the use of the *x*-rays in the examination of the thoracic contents is now so commonly resorted to.

Further, when we stop to consider that these nodes act as filters for foreign bodies and for bacteria that enter the air-passages, we would naturally expect to find them suffering as the result of parasitic invasion.

It is also interesting to note that they not rarely become affected from infections that have not taken place in the chest but in the tonsils as well, and therefore their state should be regarded with suspicion even when there is no history of an infection of the bronchial mucosa or the pulmonary parenchyma. Again they may become infected in the course of an infec-

tion involving the whole organism, as, for example, in typhoid fevers and influenza, and, of course, they suffer notably in cases of tuberculosis often when the pulmonary lesions are slight or of doubtful existence.

In a number of cases I have seen this form of adenopathy follow severe tonsillitis, and I have also seen it follow tonsillectomy of infected tonsils. In both types a noteworthy point has been that the infection of these lymph nodes does not immediately become manifest. In several cases the thoracic discomfort, the fever and cough did not develop until several weeks afterwards, at a time when convalescence from the attack or operation was supposed to be complete.

It is interesting to note that more attention has been called to this subject in the French medical journals than elsewhere, several papers dealing with it having appeared in *La Presse Médicale* during the last decade.

It is not necessary to quote from a large number of papers on this subject. One of the most exhaustive is that of Murray Leslie in the *Clinical Journal* of London of January 22, 1913, which dealt largely with etiology and pathology. Another contribution dealing chiefly with the involvement of these nodes by tuberculosis will be found in the *Australasian Medical Journal* of May 10, 1914, by Griffith of Sydney. Then there are three other papers which deal with the surgical treatment of mediastinal lymph nodes which deserve reference. One is by Betke in the *Berliner klinische Wochenschrift* of January 27, 1913, another by Lenormane in *La Presse Médicale* of January 3, 1914, and the third by Kelly of Sydney in the *Australasian Medical Gazette* of June 13, 1914.

It is not necessary to go into the minute anatomy of the bronchial lymph channels. All that is needful is to recall that they ultimately drain into the tracheobronchial nodes chiefly about the bifurcation of the trachea. Microörganisms which gain access to the lungs are, therefore, carried directly to these nodes. Furthermore, it has been shown by several investigators, notably Grober, that infection of the tonsils may eventually result in tracheobronchial lymph-node involvement. As to their infection from the abdominal area, we frequently see infection of the thoracic and abdominal nodes apparently by direct continuity. It will be recalled that some pathologists have gone so far as to claim that thoracic tuberculosis is always the result of primary infection below the diaphragm (Behring, Calmette, and Guerin).

The importance of these nodes in their relationship to tuberculous infection is illustrated by the report of Naegeli, who, finding evidence of tuberculosis in 97 per cent of persons coming to autopsy from all causes, also found that in a large proportion of these there were caseous or calcareous deposits in these nodes. Again, Jordan in his *x*-ray studies entitled "Peribronchial Phthisis," an unfortunate term in these days, states that he found calcareous deposits in the root nodes, or in those along the tubes, in the great majority of persons coming to autopsy with so-called healthy lungs.

When the glands are quite large and press upon the pulmonary tissues direct infection of the latter may occur, producing pulmonary tuberculosis or pulmonary abscess according to the infecting organism present, or the gland may ulcerate into a bronchus, and so an infection takes place by passage down the tube.

This is not the place to discuss the question as to whether apical lesions are primary or always secondary to bronchial lymph-node involvement as some assert, but it seems proved that an infected lymph flow may be proximal or distal, since the valves in the lymph vessels may become incompetent, the very enlargement of the nodes damming back the normal flow. Organisms may, therefore, enter the smaller tubes, be carried without great trouble to the nodes, cause severe disease in them, and then return to infect the lung by way of a terminal bronchus. If the nodes win the fight, the patient will have escaped the last phase, but he will still have tuberculous nodes. As the bronchial lymph nodes win

in the great majority of cases, their infection, except when they are ultimately overcome by the severity of the attack, is a triumph of the protective mechanism, the more so as the presence of the infectious organisms imprisoned in the nodes maintains a constant immunizing influence by a process of tuberculin or vaccine therapy. So, too, these nodes which have for years been the friend of their host may be the source of his ultimate destruction by being broken down during the course of some acute illness.

Physical signs, in distinction from symptoms, of enlargement of the bronchial lymph nodes are often impossible to develop either because the chest is deep, or the chest-wall thick, or because these nodes are so deeply buried that unless they are very large they cannot be discovered by methods of physical examination. The nodes of the anterior mediastinum belong to the lymphatic drainage system of the diaphragm and parts adjacent, whereas the bronchial lymph nodes, which take the flow from the lungs, are situated posteriorly. For this reason examination by percussion is to be practiced at the back rather than in front, although in children Eustace Smith's sign may be developed in some cases if they are well advanced. Dulness on either side of the spine inside of the scapulæ (the paravertebral dulness of Dantwitz) may be present. So far as actual spinal dulness is concerned it is to be recalled that the vertebræ are all fairly resonant in health except the fifth, which is usually dull, whereas if there be considerable enlargement of the bronchial nodes, the fourth, third, and second dorsal may also be dull on percussion.

The only reliable diagnostic measure is the use of the fluoroscope and *x*-ray plate, but even when this is resorted to and the report comes back that the glands are enlarged, it is to be recalled that in nearly all adults, particularly in city dwellers, these nodes are enlarged but quiescent, as the result of infection in earlier life. Such a positive report is, therefore, not final unless other evidence is added to it.

Again, it has been my experience that occasionally only one node is greatly enlarged, and although it is necrotic it may be hidden by other nodes or tissues so that it is not discovered until it ruptures into a bronchus.

The nodes on the right side are more often affected than those on the left and more frequently are larger. Meunier found in 27 cases in which the vagi were involved by pressure, or inclusion in the inflammatory mass, that 20 were on the right side, two on the left, and in five the enlargements were bilateral.

As long ago as 1874 Barety clearly described this condition and emphasized the fact that such enlarged glands might cause symptoms not alone by pressure on the bronchial tubes but also by interfering with the flow of blood in the arteries and veins adjacent to them. Further, he showed that by their enlargement nerve trunks of such importance as the vagi might have their function disturbed by this pressure.

The result of pressure on the bronchi may result in the development of physical signs of atelectasis on the one hand or of emphysema on the other, and by affecting the distribution of air in the lungs cause variations from the normal in the percussion note and cause an increase or decrease in the breath sounds on inspiration or expiration, particularly at the bases. These changes are often associated with fine or moist râles, which lead the physician to a diagnosis of bronchitis, pulmonary congestion, or pneumonia.

It is not necessary to burden the reader with detailed case reports. The following brief statements serve to illustrate the points of interest:

A girl of nineteen years after having swallowed a jujube paste lozenge "the wrong way," with the result that she suffered from a violent spell of coughing which lasted some hours and which failed to dislodge the lozenge so far as she knew, began in the course of about two weeks to develop general malaise with cough and pain in the region of the right bronchus.

There developed a rise of evening temperature of about 101° with scanty expectoration induced apparently by the constant cough rather than by reason of bronchitis. This febrile movement lasted for seventeen days, with frequent statements on her part that her trouble was a little to the right of the sternum at about the third interspace, but with no physical signs which were definite. On the seventeenth day, during an exceptionally severe attack of coughing, she brought up about a teaspoonful of pure pus, which she said came from the area where she had pain and a sense of soreness and fulness. These sensations at once disappeared, the temperature dropped to normal, and a fairly rapid convalescence was established. The sputum was always negative for tubercle bacilli, but the pus was unfortunately thrown away, so it could not be examined. Four years later the same symptoms returned, the fever reaching as high as 103° and lasting for ten days, when again there was expectorated at one time about a drachm of pus, with prompt recovery. Again in January, 1919, stricken with influenza, a more severe attack developed, with a fever septic in type and as high as 105°. Again the patient bitterly complained of the sore spot referred to above. Repeated examinations of the sputum were negative except for the organisms usually found in the mouth. So, too, repeated physical examinations by two physicians failed to discover any physical signs in the chest. After some days of acute illness a small amount of pus was expectorated which contained streptococci, the bacillus of Pfeiffer, and the pneumococcus type 4, and the temperature dropped to nearly normal for about twenty-four hours, then rose again as high as before. After several days relief, local and general, again followed the coughing of pus. Once more the temperature fell, then sharply rose, and with it severe thoracic pain which made the patient scream. Yet no signs of pleurisy were present and the *x*-rays showed "nothing abnormal in the chest." Finally at the end of nearly four weeks of illness the patient suddenly spat up so much pus that she used forty pieces of gauze in the course of an hour, and from this moment convalescence was begun with gradual diminution of distress in the spot complained of, and with the definite statement of the patient that the pus could be felt coming from that area. A more careful *x*-ray examination after convalescence than could be made during the acute illness showed a definitely thickened and enlarged lymph node where the patient always complained of pain when this node was in trouble, and also revealed no suspicion of a lesion in any part of the lungs or any adhesions in the pleuræ.

A man of about thirty years began to suffer from general malaise, a slight rise of evening temperature, and all the symptoms of an early tuberculosis with loss of weight. Careful physical examination revealed no pulmonary lesion. At the end of about three weeks of these symptoms, with cough, he spat up about two drachms of exceedingly foul pus, and from that moment rapidly recovered.

It is remarkable how many of these patients finally get relief by rupture of the purulent nodule into a bronchus, but in many of them after a slow battle between the lymph node and the invaders the suppurative process is walled off, a fibrositis develops, and the fact that pus has been present in a node is discovered long afterwards, when an autopsy is obtained, after death from some other illness. In still a third type the suppurative process is so free that before it can find exit through a bronchial tube the pus ruptures into the lung, causing a pulmonary abscess, or an interlobar empyema is produced. I have described two cases of this character recently.

An abortive type is illustrated by the case of a man who, after an attack of influenza of some severity, developed all the symptoms of an early pulmonary tuberculosis without physical signs. No pus was expectorated so far as is known. After

some weeks the general health improved, but the *x*-rays showed several of the bronchial lymph nodes enlarged and swollen, the large node which is usually found at the bifurcation of the right bronchus being exceedingly large and evidently acutely inflamed.

It is needless to cite additional cases. The point I wish to emphasize is that these bronchial adenopathies, due either to acute infection, to tuberculosis, or arising in the early stages of Hodgkin's disease, lymphatic leukemia, or as the result of metastasis, very readily mislead the physician into a mistaken diagnosis. In the acute cases pulmonary congestion, bronchitis or pneumonia may be the diagnosis. In the subacute cases the physician, because of the moderate fever, may conclude his patient is tuberculous. On the other hand, in certain cases of tuberculous infection, the absence of pulmonary physical signs may lead to a diagnosis of no tuberculosis when in reality the bronchial lymph nodes are actually and severely infected. Great enlargement of the bronchial lymph nodes may produce no physical signs, but my plea is that in cases of continued unexplained fever these nodes be regarded as worthy of suspicion and that their presence be sought for by the use of an *x*-ray study. A recollection of these facts will make clear many cases of continued fever and ill-health, and while finding these glands to be infected may not clear up the question as to the character of their infection,

FIG. 1.—Great bronchial lymph node enlargement due to tuberculosis with only a few miliary tubercles in lungs, but advanced peritoneal and retroperitoneal tuberculosis. Thoracic lesions secondary. Infection from below upwards. The center of each thoracic node is a cheesy abscess.

it will at least discover the area or focus which is responsible for the illness.

The following illustration shows to what a great extent the bronchial and retroperitoneal nodes may be involved in tuberculosis without any marked changes in the lungs save small miliary tubercles widely scattered throughout the pulmonary parenchyma. (Fig. 1.)

As to treatment, little can be done by drugs. In the early stages when suppuration is threatened or present, drugs like the iodides are harmful. When the process is subacute or chronic recovery usually occurs under hygienic measures other than drugs. If an abscess bursts into a bronchus the patient usually recovers. When it ruptures into a vessel he nearly always dies, but this accident very rarely occurs, although it may be a cause of diffuse miliary tuberculosis oftener than we think. When pulmonary abscess develops it also may get well without interference. If the general health suffers, with continued or repeated septic manifestations, operation for the relief of pus in the lung is essential, the gland can usually be let alone. The nearer the thoracic wall the better, for the reason that the pus is more readily reached, whereas in the deeper areas injury to large vessels is to be feared.

As an interesting illustration of how desperately ill these patients may be, what they may go through and recover, I quote the report of Kelly in which the infection was due to the colon bacillus, although he asserts it did not take place from the abdominal organs by direct invasion. This also illustrates the chief characteristics of other cases in their early stages in my experience:

Miss E. C. was first seen on January 7, 1913, and had been ill two days. She complained of severe stabbing pain in the lower part of the right chest anteriorly. Her previous history was that she had suffered from measles a month before, and had apparently completely recovered. She gave no history of any other illness.

The pulse was 90; temperature, 101° F.; respiration, 22. There was no coughing. On inspection there was limitation of movement on the right side, and on percussion there was no abdominal dulness in any part of the thorax. On auscultation no adventitious sounds were heard, and the heart sounds were normal. On palpation pain was complained of on pressure over the top of the ninth rib. There was no tenderness or pain on pressure in any part of the abdomen. The urine was normal.

A diagnosis of diaphragmatic pleurisy was made, and she was treated accordingly. As there was no improvement in her condition at the end of a week she was removed to a hospital.

Shortly after entering the hospital a troublesome cough developed, and with it there was a fair amount of non-offensive expectoration, and rhonchi and râles could be heard on both sides of the chest. She was given expectorants and inhalations, and in two weeks the bronchial signs had disappeared; but not the cough nor the pain, which became worse. The temperature remained up, and of a septic type, and there were some slight sweats. The pulse was now over 100 per minute, and the respirations never below 24 per minute. the respirations never went below 24 per minute.
the chest, but there were no physical signs to guide one to its position. Exploratory punctures were made on several occasions, but without result.

Some two months after her admission to hospital, it was noticed that the sputum was becoming very offensive. Considerable quantities were being expectorated, but a large quantity had never been ejected at any one time. A microscopic examination revealed coliform bacilli, but no tubercle bacilli, nor were there any tubercle bacilli found at two subsequent examinations.

Kelly now came to the conclusion that an abscess of the upper surface of her liver had worked through the diaphragm and was leaking into a bronchus, and decided to explore the under surface of the lung.

On May 15, 1913, under chloroform anesthesia, two and a half inches of the

tenth rib on the right side, in the post-axillary line, were resected. As soon as the pleural cavity was opened the lung collapsed, and there were no traces of pleuritic adhesions. The under surface of the lung was examined, and the exploring needle was passed into the upper surface of the liver in several places, but no pus was found, nor was there any connecting band between the lung and the liver felt in this situation. As there was nothing to be gained by putting a tube into the pleural cavity, the chest wound was closed. The artificial pneumothorax relieved her cough for some days, but at the end of a fortnight she was as bad as ever.

Early in June no signs were in her chest to account for her condition, but it was thought that the infection came from her abdominal cavity.

A few days later a skiagram of her chest was taken. This picture showed a shadow at the root of her right lung and extending out from it. It was looked upon as probably tuberculous.

The smell from her breath was so bad that she had to be kept on a veranda. She complained now of severe pain at the lower end of her sternum, and said that the swallowing of anything gave her a nasty taste and made her cough. She took very little food, was wasting rapidly, and her fingers were becoming clubbed.

Toward the end of June she was *x*-rayed again, giving her a bismuth meal; but nothing to aid in a diagnosis was seen in the abdomen.

On July 2, 1913, she was opened in the midline, making an incision from the lower end of the sternum to the umbilicus. There were no evidences of disease in the abdominal cavity, nor could anything be found on the upper surface of the liver. She took the anesthetic very badly on this occasion, and nearly died on the table. She was sent back to bed unrelieved.

Her condition was now pitiable; she was racked with the continuous coughing, could take very little nourishment, and was so wasted that she appeared to be skin and bones. The only relief she got was after large doses of heroin hydrochloride given hypodermically.

She was seen in consultation on August 25. Great difficulty in making an examination was experienced owing to the patient's continuous coughing; but it was thought that an abscess or suppurating hydatid cyst of the liver had ruptured into a bronchus.

Kelly felt that this could not be the case, as he had already explored practically the whole of the upper surface of the liver.

Agreeing with others that if no relief was given her she would soon die, it was decided to open her chest over the shadow, as shown in the *x*-ray picture.

On August 25, Kelly reflected back her right breast and resected three inches each of the third and fourth ribs, dividing them internally at the cartilages. On the removal of the ribs, and tearing through what appeared to be the pleura, a dense inflammatory mass was met with. With the finger he bored through this mass, endeavoring to avoid the pulmonary vessels. At a depth of about two and a half inches, and in a position, as far as one could judge, just above or in the root of the right lung, the finger entered a cavity. On withdrawing the finger, about two ounces of stinking pus and granulation tissue were ejected. The cavity was a firm, walled one. A large rubber drainage tube was inserted into this cavity. The reflected breast was brought back and sutured into position, and the rubber drainage tube brought out through a large stab wound.

No hemoptysis followed this operation, nor was any air sucked in through or blown out of the wound. The abscess drained freely, and in a few days the cough and expectoration disappeared; the temperature fell to normal, and the pulse was below 100. Previous to this operation the pulse-rate was always above 130. The improvement in her general condition was most marked. She took her food well, slept like an ordinary person, began to increase in weight, and her dusky blue color changed to an ordinary healthy glow.

Three weeks after this operation the

tube was shortened half an inch. The discharge now was less offensive and semi-purulent. The tube was removed twice a day, and at each dressing there was difficulty in reintroducing it. Finally, at about the end of six weeks, it was found impossible to reinsert the tube, and the wound closed completely in a few days.

Two days after the complete closure of the wound the irritating cough returned, and in another few days foul-smelling sputum was expectorated. Her condition soon drifted from bad to worse, and Kelly decided to reopen and drain the wound.

On October 27, 1913, she was again anesthetized, an incision was made, and the index-finger was pushed through the scar tissue. A small cavity was found, and a drain tube was inserted. The cough and expectoration ceased immediately, and the patient, from a condition of great distress, passed into one of comparative comfort.

Two days after this fourth operation it was noticed that air was being sucked in through the wound, and the removal of the dressing was followed by paroxysmal coughing. After a few weeks the discharge became serous, and the smell disappeared almost entirely.

Early in December she went to a convalescent home, where she remained for over a month, and returned early in January, 1914. She still had a small rubber tube in the wound, but there was no offensive discharge, and the patient had greatly increased in weight.

On January 20, 1914, a little over one year after the commencement of the illness, the tube was finally dispensed with, and the wound was completely closed forty-eight hours later. Two months after the final closure she was in splendid health, with no cough or any other symptom of her most serious ailment.

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# The Treatment of Tuberculosis of the Spine in Children

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The onset of tuberculosis of the spine in a child is marked by symptoms which are so definite and characteristic that the diagnosis can usually be made before destructive changes occur in the bodies of the vertebræ.

The indications for treatment are clear. The spine must be put completely at rest and the bodies relieved of their usual function of weight-bearing, and the general resistance of the child to the progress of the disease must be increased in every way possible.

If the child is seen early, before the breaking down of one or more vertebræ has occurred, it may be possible to restore the patient to health with normal mobility in the spine and no deformity. This is of course the ideal result, but unfortunately we cannot often attain it. The disease continues to progress after the spine is put at rest, and it may be several months before the destructive changes are arrested and the processes of repair are making headway. Most of the children that recover will have a kyphosis—although it may be very slight—and fixation of the spine in the region of the disease.

As soon as the diagnosis is made in an early case, the child should be placed supine upon a Bradford frame; he should never be allowed to sit up or stand; his spine should be kept constantly in slight hyperextension. In order to accomplish this, he

should lie upon a moderately convex frame, the spine being supported by two parallel felt pads. The child is therefore lying on his transverse processes opposite the region of disease—the spine being kept constantly in hyperextension by the weight of the trunk above and below the affected area, and all weight or impact upon the body or bodies of the vertebræ prevented. A leather or canvas bridle, with a light Buck's extension at the head and one on each lower limb, completes the appliance. The muscle spasm gradually relaxes and the Buck's extension acts as a restraint in preventing the child from sitting up or changing his position. If necessary an additional safeguard may be used. This is a ring of heavy iron wire covered with rubber tubing. It is shaped to conform to the child's body; arching across the top of the thorax, it descends each side in the midaxillary line and arches across the pelvis. The sides are fastened to the Bradford frame by bandages or a broad piece of muslin which passes beneath the frame. Careful attention each day to the care of the back on the part of the nurse will prevent any local pressure sores.

This treatment may be continued with advantage for three months or longer. Much may be gained by prolonged rest in bed in arresting the disease and preventing serious deformity. The acute symptoms subside, the child gains in weight, and his color improves. The children are invariably happy and contented during this long rest treatment.

When the time comes to permit the child to be up a plaster-of-Paris jacket is applied with the spine in moderate hyperextension. He is placed prone upon a muslin hammock, his body enclosed in stockinette and a thin layer of cotton wadding, the pelvis protected by a girdle of felt, and the parallel felt pads on each side of the ridge of the spine. Or the jacket may be applied with the child lying supine upon parallel felt pads on each side of the region of disease, which are supported by metal strips upon an upright stand, the head and shoulders and the pelvis being on a lower plane. The Goldthwait appliance is very convenient and satisfactory.

If the disease involves the seventh thoracic vertebra or any of those above it, it is necessary to support the head as well as the trunk. The neck, lower occiput and chin are well protected with layers of cotton wadding or felt, and the plaster then carried up over the shoulders and about the neck, lower occiput, and chin, to make a strong support which holds the head in a slightly hyperextended position on the trunk. This becomes the Calot jacket when the front of the jacket is cut away from the upper portion of the sternum to the lower portion of the abdomen. An opening in the back permits the use of pressure pads on each side of the kyphosis. In those cases where the deformity has only recently appeared a considerable amount of correction can be gradually obtained. In the cases of long standing where the kyphosis is fixed and rigid very little can be accomplished by this gradual correction. A plaster jacket may be worn for three months or longer.

After six months or a year of plaster-jacket treatment an adjustable brace may be substituted. One which we have found very satisfactory consists of a pelvic band, two spinal uprights, two crutch supports, two side-bars, two crest bands, and the canvas apron in front. The crutch supports curve upward in front of the shoulders to just above the clavicles, and are so adjusted that they hold the shoulders back, keeping the spine in moderate hyperextension against the spinal uprights, the corrective pressure being exerted upon the transverse processes on either side of the kyphosis. The side-bars extend from the pelvic band to the crutch supports, making the appliance rigid. The crest bands extend from the spinal uprights around the trunk, sinking into the loins just above the brim of the pelvis, and hold the brace securely in place, preventing it from slipping down. When indicated an adjustable head support with leather chin strap is used, so

that the head may be held in moderate hyperextension against the broad padded band which passes around the lower occiput on each side.

A celluloid jacket is durable, light, and comfortable, and as it can easily be removed for bathing the patient is a most satisfactory support. It can be made to support the head as well as the trunk. As the child grows, however, it is necessary to renew the jacket in about ten months or a year.

When the treatment is started very early in the disease, the child may have entirely recovered in two years, but in those cases where a kyphosis has already appeared from five to seven years may be required, and it is probably far safer to continue a light back support throughout the entire period of growth.

When a tubercular abscess forms we do not as a rule disturb it. There is a fair chance that it may become arrested and gradually be absorbed. It may be necessary to evacuate a retropharyngeal abscess in order to avoid the danger of a spontaneous rupture. Those in the thoracic and lumbar region may slowly find their way in the direction of least resistance until they reach a point near the surface where they can be safely aspirated.

If the child has a persistent septic temperature and we have good reason to believe that the abscess may be one of mixed infection, it may be wise to secure drainage if the abscess lies in a region where it can be opened without very much risk. A psoas abscess may be reached by an incision similar to that which is used to reach the kidney. An iliac abscess may be reached by an incision along the iliac crest, and a retroperitoneal dissection with finger and blunt instruments across the surface of the iliacus muscle until the abscess can be palpated between the fingers of one hand pressing upon the abdominal wall and a finger of the other hand in the wound. The operation must be done with great care, as it involves a region of very important structures.

When the abscess invades the spinal canal it may press upon the cord sufficiently to cause paralysis of the lower limbs. The conservative treatment is to keep the child upon the stretcher frame for many months. The abscess is gradually absorbed or finds relief from tension where the limiting wall is weakest, and the power slowly returns to the paralyzed limbs. This may require six months or a year or longer. The majority of the cases recover. Operative procedures to relieve pressure upon the cord have been successful in some cases, but they are attended by considerable risk.

Fixation of the diseased spine by means of a bone-graft or an osteoplastic operation is a valuable aid in the treatment of Pott's disease. Both methods give satisfactory results. The osteoplastic operation of Hibbs, in which the spinous processes are used in forming the bridge of bone, is difficult and tedious, but in the hands of an experienced operator gives excellent results.

The operation of Albee — inserting a bone-graft from the tibia into the spinous processes—is perhaps more frequently done and the results are very satisfactory.

It seems wiser not to attempt the operation upon very young children, and probably eight years should be the minimum age. The graft should be cut from the inner surface of the tibia to exactly conform to the kyphosis. A short lead strip which has been bent to fit the contour of the kyphosis serves as a useful guide. In the thoracic region the graft should include the spinous processes of two healthy vertebræ above and two below the seat of disease, while in the lumbar spine one healthy vertebra above and one below the disease should give secure fixation. It is not wise to attempt to straighten the spine at the time the bone-graft is inserted. In fact the greatest care should be taken to avoid any injury to the spine during the operation. The child is relaxed under the anesthetic and loses his power of self-protection. A cold abscess at the seat of disease may easily be ruptured, causing death from a rapid toxemia, or more gradually from tubercular meningitis.

Accidents of this kind can be avoided by making the plaster jacket the day before the operation and cutting it down both sides. The back of the jacket may be lifted off as the child lies prone upon the operating table and replaced when the operation is finished. This avoids all risk of twisting or bending the spine while the child is under the anesthetic. If the operation is upon the cervical or upper thoracic spine a steel upright can be incorporated in the plaster-jacket which extends, one on each side, up the side of the neck and head. A broad band of webbing attached to these uprights and passing around the forehead and occiput holds the head and neck motionless during the operation, and it may be worn during the convalescence.

Children bear this operation remarkably well. If the cases are carefully selected the mortality should not be over one per cent. We would hardly be justified in recommending the operation if it were. The principal reason for advising the operation in children is that the bone-graft may entirely arrest the progress of the deformity. It may do more than that. It may cause a spine in which there is already a moderate kyphosis to grow straight. The graft, taken from the diaphysis of the tibia, grows very slowly in length, while the arches and articulating processes of the vertebræ are growing normally, and so the kyphosis may entirely disappear.

The operation may not always succeed. This may be due to the fact that the graft does not completely span the region of disease. Or after the operation the disease may continue to progress and involve the bodies above or below the diseased area, and the bone-graft no longer provides a rigid support. The tubercular disease may find its way around the spinal cord and between the arches and infect the bed in which the graft has been placed, causing it to slough out. The child may fall and break the graft. In every case the spine should be supported by a brace or celluloid jacket for a year after operation.

An effort at gradual correction of the kyphosis by means of a Calot jacket and pressure pads may be made previous to the operation. Some improvement may be gained in this way, and if so the operation will probably make it permanent.

A child may be treated by plaster-jackets and braces until we believe that he is cured. And yet as we follow the subsequent course of the child's growth and development during a period of five years or more we will probably notice a gradual increase in the kyphosis. This can be better appreciated if we keep lead-strip tracings of the spine at intervals of six months or a year. We should not infer from this that the disease is still active. It is the result of the normal growth which has been going on in the arches and articulating processes of the vertebræ. The region which has been invaded or destroyed by the disease has been restored. But the mass of newly formed bone does not grow as do the bodies of normal and healthy vertebræ. Consequently this compact mass of bone and fibrous connective tissue does not keep pace with the growth of the arches and articulating processes, and so the kyphosis must slowly increase. This constitutes one of the chief arguments in favor of operation.

Throughout the entire course of the disease the importance of the general hygienic surroundings and care of the child cannot be overestimated. The patients should be in the open air as much as possible both day and night—protected from storm and wind—and they should not be exposed to too low a temperature in winter. An open piazza in summer and a glass-enclosed sun parlor with ample ventilation in winter seem best to serve this purpose. A nourishing diet which includes a quart of milk each day should be carefully selected. When tonic treatment is indicated, pure cod-liver oil should be given in small doses three times a day. If the child is anemic, from five to ten drops of the syrup of the iodide of iron may be given in a teaspoonful of the compound syrup of hypophosphites after each meal. It is doubtful if tuberculin has any real value in these cases.

The most important therapeutic agent is sunlight, and the nearer we can approach the methods of Rollier the more rapidly will our cases recover. Here we have the choice between the altitude of the mountainside—where the actinic rays of the sun are not impeded by the clear, thin atmosphere—and the seacoast. Children in Philadelphia and its vicinity seem to be greatly benefited by a visit of several months to the New Jersey seacoast. Heliotherapy can be carried out the greater part of the year.

The tanning of the skin is brought about very gradually, beginning with the extremities and finally including the trunk. This may require several weeks. The exposure to the sun may then be continued three or four hours each day. The blondes may be tanned to the color of rosewood and the brunettes to mahogany.

Discharging sinuses should be kept clean, the skin washed with alcohol and dusted with boric acid. Irrigating the sinuses does not aid very much in curing the disease, and the injection of bismuth paste may block a sinus and seriously interfere with drainage.

Children that seem hopelessly ill will make the most astonishing recoveries. A boy of twelve was recently brought to me for examination. He appeared to be in perfect health—good color and apparently normal in weight and development. I had not seen him for two years. He was still wearing his brace, had not used crutches since June, 1920, and there were two sinuses which had almost ceased to discharge. He said he felt quite well and complained of nothing. He was admitted to a hospital ward under my care about two and a half years ago. He had several profusely discharging sinuses, an extensive tubercular osteomyelitis of the sacrum and left innominate bone, and the destruction of the head of the femur with pathological dislocation. He appeared septic and very ill. The case did not seem a hopeful one. And yet the boy at this time looks the picture of health.

There is in Philadelphia an institution for the care and education of crippled children. One hundred children can be cared for. Each child remains ten years—entering at the age of about eight and finishing his training at about eighteen. Ten or twelve children are admitted each year, and the same number leave the institution. It has been stated that the grounds and buildings together with the endowment represent a total investment of about five million dollars. Money invested at five and one-half per cent and the interest compounded semiannually doubles itself every thirteen years and a few days. Therefore, supposing the institution is spending its income, every child that is admitted receives the equivalent, directly or indirectly, of more than thirty-eight thousand dollars. This is probably the most remarkable charity in the world.

With a similar five million dollars there might be erected and fully equipped a group of buildings upon a hilltop in the beautiful suburban country lying to the west or northwest of Philadelphia capable of housing five hundred children. An annex of another group of buildings could be erected on the New Jersey seacoast with accommodations for another three hundred children. The institution could own its own farm, providing the children with milk, butter, eggs, poultry, and fresh vegetables. This institution could give the best of care and scientific treatment to a total of eight hundred children suffering with tuberculosis of the bones and joints from the beginning of their illness until cured.

# The Vitamines and Their Relationship to Health and Disease[1]

## III. Their Practical Application to Medicine

BY A. D. EMMETT, PH.D., NUTRITIONAL CHEMIST

*(Concluded)*

Wherein does the practical application of these vitamine studies lie with respect to clinical medicine? We have shown that with the total absence or with the subminimal amount of the vitamines, even when all other dietary factors are adequate, very profound and marked disturbances are produced experimentally, and that even death may ultimately result. The symptomatology in some of these instances is very complex. Especially is this so when the amount of more than one of the vitamines is distinctly reduced and when there is also an excess of protein or fat or carbohydrate or certain mineral salts.

It is seen in the accompanying table that there is a marked similarity in a number of instances with respect to the effects produced by the partial or total absence of each of the different vitamines. For example, there is a decrease in appetite and in body weight; indications of digestive disorders of one kind or another; a lack of muscular tonus; anemia, and nerve dis-

COMPARATIVE EFFECT OF LOW AMOUNTS OF VITAMINES.*
(*Produced experimentally on rats, pigeons, guinea-pigs, and monkeys.*)

| | FAT SOLUBLE VITAMINES. | WATER SOLUBLE B VITAMINE. | WATER SOLUBLE C VITAMINE. |
|---|---|---|---|
| Decrease in appetite | ++ | +++ | ++ |
| Cessation of growth | + | +++ | ++ |
| Loss in weight | ++ | +++ | +++ |
| Sluggishness and drowsiness | +++ | + | ++ |
| Asthenia—lack of tonus | ++ | ++ | +++ |
| Digestive disorders: | | | |
| Stomach—congestion and inflammation | ++ | ++ | +++ |
| Intestines | ++ | +++ | +++ |
| Gastric and pancreatic secretion retardation | ? | ++ | + |
| Bile accumulation in the duct | Slight | +++ | — |
| Heart: | | | |
| Atrophy | + | ++ | + |
| Hydropericardium (edema) | None | ++ | — |
| Blood—red blood cell count | Lowered | Lowered | ? |
| Endocrine glands: | | | |
| Adrenals—hypertrophied | ++ | +++ | ++ |
| Congestion | — | — | ++ |
| Adrenalin content | No change | Increased | Decreased |
| Cortex—atrophied | + | + | ? |
| Pituitary—hypertrophied | None | + (male) | None |
| Thyroid—atrophy | None | Slight | None |
| Parathyroid—post-bronchial body—atrophy | None | Slight | None |
| Thymus—atrophy | + | +++ | + |
| Pancreas—atrophy | + | ++ | ? |
| Testes—atrophy | + | +++ | + |
| Ovaries—atrophy | + | ++ | + |
| Liver—fatty infiltration and congestion | + | +++ | ++ |
| Spleen—atrophy | + | ++ | ? |
| Eyes—weakness, xerosis, xerophthalmia, etc | ++ | None | None |
| Leg and rib bones—decalcification | ++ | None | + |
| Teeth | Caries | None | +† |
| Nerve centers—alteration | ++ | +++ | ++ |

* Compiled essentially from the work of McCarrison, Emmett and Allen, Cramer, and Findlay.
† Bleeding gums, looseness, degeneration of pulp.

[1]From the Medical Research Department, Parke, Davis & Co., Detroit.

turbances. On the other hand, there are some very definite dissimilar effects produced by the different vitamines—a specificity, as it were—indicating that there is such an interdependence between them that it is essential for all to be present in order to produce the optimum beneficial results in respect to growth, development, reproduction, and lactation.

Stated in another way, in the absence of any one vitamine there is a lack of harmony and the resultant effect is variable, depending upon which combination of vitamines remains. Therefore, the function of the vitamines seems to be that of coördinating and adjusting the various metabolic processes. We may compare their position in the nutritional cycle to that of the switchboard in the telephone exchange, in that they serve as the direct contact for the rapid and economic relationship between the physiologic supply and demand of the body.

CLINICAL ASPECTS OF VITAMINE DEFICIENCY.

Bearing in mind that the available evidence indicates that vitamines are not synthesized in the body, that they are stored in the tissue to only a limited extent and that they can be obtained only from external sources, let us consider them more in detail. It is extremely important to note the wide range of disturbances that take place when these "food hormones" are low in quantity. It would seem that alterations in the metabolism of the cells have produced all these changes. This being so, then we may have a key to the etiology of many of those conditions which have been so puzzling to the medical profession.

In this light, it is very obvious that the degree of disturbance produced will vary not only with the relative minimum amount of vitamines present but also with the ratio that exists with respect to the proportion of one vitamine to another. Further, with an excess of carbohydrates, fats, mineral salts, or proteins, and with the wrong proportion of these to one another, the vitamines are considered by some to be less available. Thus, referring to the recent work of McCollum, Park and associates; Hess; and also Sherman and Pappenheimer, they have shown conclusively in the case of rickets, under experimental conditions, that the extent of the pathology may depend not only upon the fat-soluble vitamine factor but also upon the relative ratio and availability of the calcium and phosphorus present.

Then we should also not lose sight of the important fact that when disease sets in, the digestive and assimilative powers are generally the first to be appreciably altered. As a result the amount of the vitamines that are brought to the cells by the blood stream is decreased, whereupon it is evident that a consequential secondary complication enters into the case. For if the vitamine requirements are increased during disease, when the reserve substances are being rapidly consumed, when the red blood cell and the leucocyte counts are decreased, and when the bacterial requirements are being met at the expense of the body needs, then we have a paradoxical situation arising, for at this very time the vitamine intake (as food supply) is lowered, either because the patient does not care to eat or the physician directs that a special or limited diet be used. In either case it generally happens that the vitamine content of the food offered is extremely depleted, or else it is not in a relatively available form.

All this should bring to us in a very forcible manner the fact that there are almost innumerable pathological possibilities that may be augmented, due to this one fundamental cause alone—the insufficiency of a proper vitamine supply to aid the normal metabolism of the cells, thereby lowering the resistance and increasing the tendency to infection.

True it is that we may have produced experimentally, in the instances cited, the extreme pathology in the animals—clinical conditions which very rarely exist as such in man. Yet there are all sorts of gradations and shades or types of these conditions that frequently come within the scope of the average physician's experience, and which must suggest to him somewhat simi-

lar syndromes which can be correlated with what we have previously detailed.

INFLUENCE ON THE DIGESTIVE TRACT.

Now let us follow more closely the general trend of events. When there is an insufficiency of vitamines, one of the earliest signs manifested is in the appetite—either a decrease in the desire for food, or a perversion for sweets or meats—which means in either case a lowered vitamine intake and an unbalancing of the diet. The natural sequence is a disturbed digestion, followed often by a loss of weight, and later on by the definite appearance of undernourishment and malnutrition. Upon autopsy this condition is reflected in the general appearance of the intestines.

McCarrison has possibly done the most extensive work that has yet been published in respect to the effect of faulty foods upon the gastrointestinal tract. His work was carried on not only with guinea-pigs and pigeons, but with monkeys. The data presented give positive evidence, both macroscopically and histologically, that he was able to produce symptoms clinically, which are comparable to those in man, namely, dyspepsia, mucous disease, colitis, coeliac disease, chronic intestinal stasis, gastric and duodenal ulcer, and intussusception. The fact that the author made a special effort to carry normal control animals in his experiments parallel with each test on the deficient diets, and that in the histological studies the greatest of care was taken to compare sections from exactly corresponding positions, should be borne in mind. The autopsies were also always made as soon as possible after death to avoid any postmortem changes.

He obtained a congestion of the mucous, submucous and serous coats of the stomach and intestines. There were also some hemorrhagic conditions. The myenteron was atrophied and there were degenerative changes in the Auerbach plexus of the colon. The author also found that the gastric glands were atrophied; as was the liver, which showed passive congestion, and necrobiosis with karyolysis; and that the gall-bladder was often distended.

Since the observations on the monkey were quite similar to what he found in the smaller animals, we can assume with a great deal of assurance that the same pathology would occur in man under like conditions.

He concluded in part, as a result of his studies, that:

1. "A distinct relation exists between the amount of vitamines required and the balance of the food in proteins, carbohydrates, fats, and salts; the efficacy of the vitamines is dependent on the composition of the food mixture."

2. "A distinct relation exists also between the amount of vitamines required and the rate of metabolic processes."

3. "Each vitamine plays a specific part in nutrition."

4. "One vitamine cannot replace another, although its function may be interfered with by the absence of another."

5. "All vitamines are concerned in the maintenance of the orderly balance between destructive and constructive cellular processes."

In McCarrison's work, he fed natural foods prepared by modern methods and made no attempt to balance the diet exactly with respect to all factors but one. Therefore, it happened at times that he had more than one variable in his deficient diets.

To substantiate these findings, with respect to the effect of the absence of the vitamines on the pathological condition of the various organs, Emmett and Allen in 1919 carried out a series of tests on albino rats. The animals were fed on synthetic diets, so that only the so-called vitamines A and B were lacking in the respective series. Normal control tests were also carried on. Upon examining histologically the digestive tract and the various organs, it was found that the results were very similar in several instances to those cited, thus confirming the statements that these two vitamines had a definite influence on the gastrointestinal tract. One outstanding fact was noticeable on the lack of vitamine B diet, namely, that in 14 out of 17 cases there was a variable degree of fatty

infiltration and degeneration of the liver, and in the others there was distinct congestion. With the diet lacking the vitamine A, this condition did not occur. The intestinal tract often appeared congested and the pancreas and spleen were anemic.

Cramer also fed rats on a synthetic diet and his results corroborated those just cited. Findlay reported an investigation upon the rôle of the vitamine B in normal metabolism. He found, in feeding pigeons and fowl milled rice, that the walls of the esophagus, the crop and the glandular stomach were distinctly thinned due to atrophy of the muscle fiber. The intestinal wall was atrophied. The mucosa and the muscular coats of the duodenum were atrophied and congested. The liver was congested, and in some instances there was fatty degeneration. The pancreas was blanched and also atrophied.

From what has been stated as to the condition of the digestive tract, one can easily understand that there will exist a marked lack of muscle tonus and a sluggishness which may resolve itself into either one of two things—an impaction of the bowel, or the opposite, a dysentery—and then there will be a distinct decrease in the assimilative properties of the intestinal mucous membrane, with the resultant effect of an accumulation of toxic end-products which in turn will have their detrimental and poisonous influences.

It is thus seen that the withdrawal of vitamines has a very marked and definite effect upon the digestive system as a whole. Enough has been cited to emphasize the fact that more stress should be put upon the diagnosis of many of those intestinal conditions that thus far may have appeared to be of an indefinite nature and also upon many of those conditions that are definitely classified. From these instances it is evident that all the essential dietary constituents—vitamines, proteins, fats, carbohydrates, and mineral salts—must be present in proper amounts and in proper relative proportion to prevent, retard, or alleviate these intestinal disorders.

### THE ENDOCRINE GLANDS.

Aside from the disturbances of the intestinal tract, the next outstanding feature resulting, either directly or indirectly, from the lowered supply of vitamines is the effect upon the endocrine glands. When one ventures to explain the inter-relationship between the vitamines and the ductless glands, he immediately enters upon an almost virgin field. We know none too much about the function and interdependence of these glands in themselves. It is pretty thoroughly agreed, however, that when one of the glands is affected it in turn has a more or less definite influence upon the others, and that the metabolic processes are then disturbed in some direction.

Before proceeding further, let us consider in a general way some of the properties of the endocrine glands. The adrenals and the pancreas primarily, and also the pituitary and the thyroid to a minor degree, regulate the carbohydrate metabolism. The adrenalin of the medullary portion of the adrenals acts on the sympathetic nerves and particularly on the musculo-neurol junction. Passing as it does indirectly into the vena cava, then on to the lungs, the left heart, and the general circulation, the adrenalin reaches the peripheral circulation of the muscles and intestines. According to Falta, it produces a moderate hyperemia of the lungs, heart, brain, kidneys; a marked hyperemia of the peripheral venous system, and also of the liver and the roots of the portal vein. This means a forcing of large amounts of blood into those organs and tissues which are the seat of much of the metabolic regulatory functions. The inhibition of this medullary secretion should, therefore, be accompanied by some definite changes.

The cortex of the adrenals contains a lipoid material which appears to be concerned in the proper functioning of the sympathetic nervous system, and in the maintenance of the spermatogenosis. Findlay reasons on this basis that the cortical substance is essential to the formation of

nucleic acid, which is vital to the activity of the central nervous system and the genital organs. It is also thought by some that the cortex has a detoxicating function, as shown when the supply of lipoid is decreased by its action on the gastrointestinal tract and the nervous system.

In the case of the thyroid, this gland has a very definite relation to metabolism, growth, and the stimulation of the sympathetic functions of the nervous system. With a reduction in its activity, there is a general retardation of the various processes. Depending upon the extent of the diminution, the disturbance may affect the skin, hair, nails; produce drowsiness and faulty memory. At times edema may result, with a swelling affecting the membranes of the mouth, larynx, uvula, tonsils, and thus rendering breathing difficult. The sebaceous glands sometimes atrophy. The teeth become carious and wear off easily. There is a lack of tonus of the autonomous nerves of the intestines, causing constipation. Besides, the genital apparatus becomes atrophied with a loss of virility.

Parathyroid glandular insufficiency brings about a greater or less degree of tetany depending upon the extent of the injury to the gland and the age of the subject. The gland is thought by some to influence the development of the enamel of the teeth and to have some relation to osteomalacia. It is also said to have a detoxicating function. MacCallum refers in this connection to a tetany condition existing when the gland showed no disease, but was influenced directly by an intestinal disturbance.

The pituitary body has a relation to the adrenal cortex and hence to the genital organs. A retardation of its activity produces lack of initiative and apathy. Some consider it to have a relation to calcium metabolism. It seems to have considerable influence on the carbohydrate metabolism.

As stated before, the pancreas also bears a definite relation to the carbohydrate metabolism. In cases where the pancreas is not functioning normally we may have as one fault the inhibition of the adrenals which promotes the setting free of sugar, and in case there is a thyroid deficiency, it tends to interfere with the liberation of the sugar. When the carbohydrate utilization is altered we may have an imperfect consumption of fats, which is similar to what happens in starvation. The ultimate outcome of this imperfect combustion is the appearance of acidosis, and later air hunger.

The thymus bears some relation to the mineral metabolism and a deficiency has some effect upon the calcium retention, and also upon the retardation of growth.

### INFLUENCE ON THE ENDOCRINE GLANDS.

Now, if we associate these statements regarding the action of the endocrine glands with the effects which were mentioned in the preceding paper and also those cited in the table above as being due to a vitamine insufficiency, it may then be stated that while the primary disturbance produced was apparently gastrointestinal, the secondary one was probably that of an endocrine glandular nature. Of these glands there are two which seem to be especially affected, the pancreas and the adrenals. It is difficult to conclude which is the precursor of the other, but it is suggestive that the pancreas might be altered before the adrenals. For in the former case this gland is atrophied and blanched or anemic, and the intestinal area about it is generally congested. Further, the gall-duct is often hypertrophied. In the second instance the adrenals are probably hypertrophied, due to a compensatory action and also on account of a certain amount of toxemia. Then it would seem that the thymus is the next to be disturbed as evidenced by its marked atrophy. Following this, the thyroid, parathyroid and pituitary may be influenced to a minor degree. This last statement is based primarily upon the similarity of many of the symptoms which develop when these three glands are inhibited, and not upon the size or histological appearance of them, the thought being that the alteration produced by the faulty diet is not sufficient to manifest the usual clinical syndrome that

accompanies a typical and more pronounced change of the glands.

We may consider the probability that the atrophy of the pancreas affected the carbohydrate metabolism, and retarded the action of the adrenals. The result was an alteration which not only served to influence that of the carbohydrates, but in a measure the activity of the other glands. If so, this may account in part for the poor oxidation in the liver and the instances of fatty infiltration.

The cortex of the adrenals, according to McCarrison, Cramer, and Kellaway, is atrophied to a marked degree. Findlay maintains on the other hand that under similar conditions the cortex is hypertrophied along with the medulla. On this basis Findlay argues that in those instances where there is a minimum amount of vitamine, using pigeons, the excretion of the lipoid material in the cortex is immobilized. As a result the neurons are not properly nourished, and then typical paralysis, as in polyneuritis, occurs due to this inhibition which affects certain of the sympathetic nerve centers. Also the genital organs are affected, as shown by the marked atrophy. As soon as treatment with the vitamine is administered the lipoid substance is liberated and the nerve "block" is thereby removed, and rapid recovery from paralysis follows. Findlay makes a special point to attribute this as being due to the increased depletion of the nucleic acid in the brain, or expressed conversely, the fundamental cause is nucleic acid starvation. Whether this explanation is correct or not, evidently the lipoid material of the cortex does have an influence, either from the fact that it has been immobilized in the gland or that it has not been produced in sufficient amount to meet the needs of the neurons.

Similarly, if we attempt to explain the various conditions that manifest themselves when other vitamines are lacking, it would appear that this whole subject could resolve itself into a question of faulty nerve stimulation which in turn interferes with the metabolic cellular processes. The fact remains then that whatever relation the endocrine glands may bear to these conditions, the basic fault rests initially upon the poor nutrition of the cells.

### VITAMINES AND ENDOCRINE GLANDULAR HORMONES.

What has been stated as to the endocrine glands should not be confused with the idea that vitamines will suffice to stimulate them to function normally when they are in the hypo or hyper condition that brings about the definite symptoms which are recognized under specific classification as cretinism, goitre, acromegaly, gigantism, etc. The two ideas should be kept distinctly apart, at least for the present. This point is illustrated by referring to some work that Emmett and Allen did with tadpoles. They found that the vitamines had an influence upon the size of the body, in terms of length and breadth, but that they had relatively slight influence in stimulating the metamorphosis. However, if desiccated thyroid gland or potassium iodide was used in very small amounts, the rate of the development of the legs was increased markedly. In other words, the vitamines acted to only a limited extent in stimulating metamorphosis of the tadpole. In this thesis one should consider then the vitamines as influencing the endocrine glands in the sense of being exo-hormones.

### RÔLE OF THE VITAMINES.

Having considered the fact that the chemical knowledge and nature of the vitamines is extremely meager; that they are more or less unstable to many of the ordinary influences such as heat, light, alkalinity and oxidation; that they are distributed with some fair degree throughout the vegetable and animal kingdom and hence should be available in our natural foods; that many of the canned and prepared foods are likely to be distinctly depleted in them; that we have no means of determining whether they are present except by biological tests in feeding animals; and finally, that they are absolutely essential to the normal physiologic requirements of the animal body—let us then consider briefly

the rôle that they, the vitamines, play in the nutritional economy.

It has been shown that no form of life can exist with an absolute lack of vitamines. In case of certain dietary deficiency diseases, it would seem that the crucial cause rests, however, upon the partial and insufficient supply of vitamines. For under these conditions the outgrowth manifests itself in the genesis of many of the indefinite and ill-defined conditions that have as yet no clear etiology.

The vitamines are definitely related to the growth of the cell. In infants we see one type of deficiency as marasmus, another as rickets, and another as subacute scurvy. Again, the condition of dental caries is associated with a fat-soluble vitamine. We have anemia, constipation, asthenia, sterility, impoverished lactation, all of which may be referable to improper nutrition in which the vitamines serve a part. We have the convalescents from long-standing disease who are unable to assimilate their food properly, due in part to the dormant activity of the muscular walls of the intestinal tract, which are the first to be affected by a vitamine deficiency. Some have considered that pellagra and sprue are partially the result of a lack of the vitamines.

In short it would seem that these food hormones are very essential in all stages of life—from infancy to old age, in health and particularly in disease.

VITAMINE THERAPY AND FOOD SUFFICIENCY.

As we have stated before, it is the sick with whom we should be concerned in respect to the supply of vitamines. It is here that the appetite is poor, digestion retarded, and assimilation lessened. If our ideas are correct with respect to vitamine insufficiency, the patient should be given a good supply so as to activate the retarded metabolic processes.

The ideal plan would be to regulate the diet so as to furnish an abundance of vitamines in an available form. This is difficult to do even in the hospital, let alone in the home. The reasons for making this statement are: First, on account of the indefinite knowledge that is at hand as to the vitamine content of foods; second, the lack of clear information as to what effect the method of preparing the food will have on the maintenance of the activity of the vitamines; third, the degree of availability by the sick of the vitamines in the food; and fourth, there is much uncertainty as to the quantity of vitamine in the food that will actually be of physiologic value, taking all these facts into account, together with the idiosyncrasies of patients.

In view of this, it would seem best to follow the same procedure as in other forms of medication, namely, to use concentrated pharmaceutical products *rich* in the vitamines, such as cod-liver oil, which contains 250 times as much fat-soluble vitamines as butter, or those products specially prepared from brewers' yeast or rice polishings, etc., which should contain the water-soluble B vitamine. The most synergistic form of a product would seem to be one that contains all the vitamines, for it is evident at the present stage of our knowledge that we are not in a position to make a sufficiently clear differentiation as to just when each type of vitamine should be prescribed. Further, there is no evidence to substantiate the idea that vitamines are injurious if taken in reasonable amount. In fact, by the mere analogy that natural uncooked foods contain the vitamines and that it is only from them that all animal life can obtain its supply, we can conclude that they are not toxic.

Still the idea of using vitamines for the sick should certainly not be segregated from the dietetic aspects of the subject. We have stated repeatedly that the other nutritive factors—proteins, fats, carbohydrates, and mineral salts—are very essential. Therefore, the logical method of procedure would be to follow the vitamine medication with moderate amounts of well-selected and prepared foods—chosen from the standpoint of furnishing not only sufficient calories, but all the constituents as well.

If this plan is followed, taking of course

precaution to see that the intestinal and urinary tracts are properly irrigated, the patient will be placed in the optimum condition to obtain the maximum from his nourishment. This means that he will, in turn, be in much better condition to resist the inroad that disease may be making upon him, and also to avail himself to better advantage of the other medication that is used. In short, recovery should then be more rapid and convalescence shortened by this procedure, all of which shows the relation of the vitamines—"the infinitely little"—to health and disease, and hence their indispensability in the physiologic economy.

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## Pituitrin in Obstetrics.

MENDENHALL, in the *Indianapolis Medical Journal* for August, 1921, in considering the indications for the use of pituitrin states that no one questions its safety and value under a great many conditions that may arise following the birth of the placenta; in fact a great many authorities are giving it routinely as soon as the birth of the placenta takes place.

Two noted obstetricians are at present giving it routinely immediately upon the birth of the child. Both these men have very large series of cases so handled and as yet have had no unpleasant results—such as retention of placenta, etc.—but until more has been done along this line conclusions had better be reserved.

A number of operators are administering pituitrin just as the uterus is being incised in Cæsarean section, or very promptly after extraction of the child, and when sustained by ergot this procedure may be strongly indorsed.

Some authorities are reporting fairly successful results in the administration of pituitrin to aid in the emptying of the bladder during the puerperium.

When the cervix is fully dilated, when it can be accurately determined that there is no disproportion between the passage and the passenger, when the presentation and position are normal, when there are no obstructing tumors, such as fibroids, etc., and when the pains are weak and are declining, we may be said to have indications justifying the cautious use of small doses of pituitrin—2 to 3 minims—remembering that episiotomy, or low forceps, or both, are usually better obstetrics.

The contraindications are:

1. Undilated cervix.
2. Disproportion between passenger and passage.
3. Abnormal presentation or position.
4. Presence of obstructing tumors.
5. Scar from previous Cæsarean or myomectomy.
6. Heart disease of mother.
7. Eclampsia.
8. Atheroma.
9. Threatened asphyxia of child in utero.
10. Contractions which are already strong.

If this latter point alone were constantly borne in mind there would be far less use of pituitrin and consequently very much less damage done. So long as the patient is having fairly strong and frequent pains there can be no excuse for giving her a drug that will increase them in frequency or strength when attended with such great dangers.

[1] Attention is called to the fact that in the spelling of vitamine, the growing tendency is to drop the final "e," making *vitamin* and *vitamins*.—AUTHOR.

# Editorial

## CONFLICTING VIEWS AS TO LOCAL ANESTHESIA FOR TONSILLECTOMY.

On numerous occasions we have pointed out that tonsillectomy is an operation which is too frequently resorted to, and again we have emphasized the fact that it is to be regarded in one sense as a major operation because it presents possibilities of complications which the ordinary practitioner is not well qualified to meet. Indeed we believe that tonsillectomy should be performed only by those who have been carefully trained in its performance.

For many years practitioners who make a specialty of the throat and nose have been divided into two camps. In one camp general anesthesia is always resorted to when a tonsillectomy is to be performed. In the other local anesthesia is solely employed. There can be no doubt that during the war the number of tonsillectomies done under local anesthesia increased enormously, because at the various points where troops were congregated it seemed the easiest and most rapid method of clearing out these infected glands. So many tonsillectomies were done under local anesthesia that the confidence of the profession in the efficiency of local anesthetics under these conditions materially increased.

We think it is of interest to note that in a recent issue of the *Journal of the American Medical Association* there is a paper by Fisher and Cohen in which they report in considerable detail upon the occurrence of pulmonary abscess in adults following tonsillectomy under general anesthesia. Their conclusions are as follows:

"The intensely practical phase of the discussion is how to avoid this unfortunate complication. If we are to profit by the experience of others, the one outstanding fact is that out of this series of seventy-six reported cases, seventy-four of the patients, or practically all, were operated on under general anesthesia. On the other hand, we have the experience of laryngologists, such as Wilkinson, who reports 1000 consecutive tonsillectomies under local anesthesia without even so much as a case of bronchitis. Similarly, the experience of Albert Ochsner and L. S. Dean, as well as our own experience, covering a tremendous number of cases in which operation was performed under local anesthesia, without a single complication, seems to be convincing evidence that the general anesthetic, whether acting directly or indirectly, is the determining factor in the causation of this complication.

"How, then, does the employment of local anesthesia operate to obviate this complication?

"1. It removes the possibility of aspirating infective material.

"2. It produces a marked constriction of the lymph and the blood channels in the field of operation, thus preventing the introduction into the circulation of infective emboli.

"3. It reduces general shock, and the general ill effects which always ensue to a greater or less degree after general anesthesia, particularly ether.

"4. It cannot possibly light up a quiescent lesion anywhere in the respiratory tract.

"We deem tonsillectomy in the adult safest when done under local anesthesia."

On the other hand we find that a committee of the American Medical Association, appointed to determine the advantages and disadvantages of the various local anesthetics, believe evil results occur more frequently than the literature would lead us to believe, and strongly urge that this important question shall be finally settled by

further investigation. To use their words, deaths from the administration of local anesthetics are vastly in excess of the number reported in the medical journals; while it may be true that the administration of a general anesthetic increases the risk of pulmonary abscess as a sequence of tonsillectomy, it is also to be recalled that those occurring during operation when local anesthetics are used are probably more frequent and possibly much more fatal.

## ALCOHOL AS A DRUG AND NOT AS A BEVERAGE.

The title of this editorial note, or one resembling it, has headed other articles for so many years that some may consider that it covers an exhausted subject, but as a matter of fact the subject is not exhausted, and the enforcement of the Prohibition Act is beginning to produce results which are interesting and important to the medical profession.

Entirely apart from the evil influences of alcohol when used to excess by the individual, and entirely apart from its evil influences on the social order when used in excess, its employment as a drug is becoming more clearly recognized, partly because it cannot be obtained except as a drug and partly because, under the Prohibition Act, the fact that alcohol possesses therapeutic power is recognized in that reputable physicians may prescribe limited quantities of it in the treatment of disease. Such a differentiation between the use of alcohol as a beverage and its use as a drug is of vast importance, because heretofore these two uses have been hopelessly confused, with the result that the profession has been somewhat divided: some of them siding with those fanatical individuals who believe that alcohol is always a curse and never a benefit, and those holding fast to opinions reached through large clinical experience that the drug is a useful one, possessing limitations as do all other drugs.

If any one thinks that the subject of alcohol has been settled once and for all even as a sociological problem, he is certainly mistaken, for the rest of the world has not advanced, or receded according to the views of different individuals, as far as has the United States, and even when alcohol comes to be recognized as a drug, or a remedy to be properly used in disease, there will still be some who, because of its occasional abuse, will be ready to attack it.

It is interesting to note that those medical men who are best qualified to determine the medicinal value of this substance are strongly in its favor, recognizing its limitations just as they recognize the limitations of every other drug which nature or chemistry has given to mankind. When medical bodies or medical individuals have condemned alcohol as a drug, the condemnation has resulted from the opinions of those who know least about it rather than those who know most about it. Oftentimes some resolution is passed by a medical organization when only a few members are present, and those few members have been gathered together for the specific purpose of forcing their views upon the community. Usually the widest publicity is given to such a news item, whereas, for obvious reasons, when strictly medical meetings discuss this matter from a scientific and medicinal standpoint, little attention is attracted.

These preliminary remarks, which we repeat are to be definitely separated from the great theme of alcohol as a beverage, are apropos of a series of contributions and a discussion made by different members of the American Therapeutic Society at its recent meeting, in which many of the scientific investigations which have been made concerning this drug were brought forward and the clinical value of the drug was discussed.

Diner of New York closes his paper, in which he summarizes what might be called the physiological action of alcohol as a drug, by quoting the words of the late Abraham Jacobi, President of the American Medical Association but a few years before his death, in which Jacobi said: "I do not

contest observations of experiments in either health or disease in man or animals; one of the most profitable laboratories, however, is the hospital or private bedside." As we all know, this eminent man repeatedly reported the success which he obtained in the treatment of various forms of disease by this drug in large doses.

In the paper by Mallory of Washington, who wrote upon the "Effect of Alcohol on the Gastro-intestinal Tract," the same view was expressed that alcoholic beverages have a certain practical application in the treatment of disease when it is desired to influence the gastrointestinal tract, adding that its therapeutic use and contraindications must be determined here as elsewhere by the physician in each particular case, it being recognized that in many instances the contraindications will be stronger than the indications.

In still another paper upon "The Effects of Alcohol in the Therapy of Internal Diseases," by Stockton of Buffalo (than whom there are few who have had a larger experience and who have written more largely upon diseases of the alimentary tract), he uses these words: "The action looking toward the exclusion from the Pharmacopœia of alcohol as a remedy probably fails to represent the opinion of the majority of the physicians. The action of the House of Delegates to the American Medical Association on this subject makes it advisable that the American Therapeutic Society review the subject thoughtfully, avoiding if possible the acrimony which heated debate often engenders." Stockton then goes on to say that any substance so potent as alcohol and so widely and indiscriminately used both socially and medicinally in the past must necessarily have been harmful to many, and admits that in many instances the happy effects which have followed its employment have been in reality due to its dulling influence upon the nervous system and the temporary relief to mental and physicial suffering. This we believe to be a very important therapeutic result and one which is often exceedingly desirable, although we are in accord with Stockton in condemning the use of alcohol as a stupefier or remedy to obscure symptoms which had better be allowed to continue in order to make the course of the disease the more clear to the physician and patient.

As he well says, the arguments advanced against the therapeutic use of alcohol might be just as wisely raised against any drug, and because it is competent to do harm, this is no reason it is not competent to do good. He then discusses the various conditions in which he believes it to be useful, and emphasizes the point, which is self-evident but nevertheless worthy of remembering, namely, that when alcohol is used as a therapeutic agent it should not be given in quantity greater than that which the organism can readily oxidize.

It is interesting to note that so conservative a practitioner with so many years experience back of him concludes his paper to the effect that the present legal restrictions to the therapeutic employment of alcohol place upon physicians an unusually heavy burden and add perplexity to our efforts in relieving human suffering.

In another paper by Bishop of New York, after emphazing the point which we have already emphasized, namely, that this discussion deals with alcohol as a drug and not as a beverage, he states nevertheless that he has never found it desirable or necessary to prohibit its moderate use in people suffering from heart disease or arteriosclerosis, that it will often give relief in angina pectoris or physical collapse, although so do other drugs, such as nitroglycerin and aromatic spirit of ammonia.

Sajous of Philadelphia, in discussing the effects of alcohol upon the endocrines, quotes largely from other writers and expresses his regret that those who have been most active in antagonizing its medicinal use have ignored the teaching of real science concerning it.

Last of all, Morris of New York, writing upon "Alcohol and Surgery," describes

its employment when indicated for the relief of pain, its local application when diluted with water as an evaporating lotion, its employment in the "flaming" of instruments for rapid sterilization, its use by gynecologists in 25-per-cent solution, for flushing purposes in cases of septic endometritis, and concludes his paper by stating that after surgical operations, for the purpose of overcoming the effects of shock and for stimulating flagging energies into activity, alcohol appears to have a place of considerable importance at times, although good judgment is required in order to avoid injurious action. He also points out that continuous vomiting after surgical operations is sometimes quieted promptly by small doses of champagne, and the patients who are making slow recovery from operation occasionally make prompt response for the better when alcohol is given in the form of good wine or spirits.

In the discussion of these papers, Dr. Osborne of New Haven expressed the belief that the medical profession could get along without alcohol in the treatment of disease, but according to the report in the *Medical Record* he immediately qualified this statement by the further one that he did not mean by this remark that there were not indications which were better met by alcohol than by some other drug.

Before concluding this subject the American Therapeutic Society passed a resolution to the effect that alcohol has a proper place in the treatment of disease, and ordered that this resolution with another along the same line should be sent to the proper authorities.

Once more let us express the hope that our renewed discussion of this important problem is separated as far as possible from the use of alcohol as a beverage and from its employment in social life. It deals solely with the question of whether alcohol, properly used, is one of the agents which physicians should be trained to employ skilfully in the treatment of disease. We think the answer is emphatically in the affirmative.

## ACCURATE THERAPEUTICS IN THYROID DISEASE.

Although the advances which have been made during the last twenty years in our knowledge of the influence of the thyroid gland in nutritional processes have been very remarkable and encouraging, it nevertheless remains true that even in connection with this most studied organ there is a large field of ignorance still in existence.

Some months ago in discussing the pathology and treatment of its disorders, we pointed out the necessity of bearing in mind that there is more than one type of exophthalmic goitre, and in all probability at least three types, namely, that in which there is a true hypersecretion of the gland due to overgrowth or overactivity of its parenchyma; another type which begins as an adenomatous change but which is finally developed into a condition in which in addition to tumor formation hypersecretion takes place; and still a third form with rather indefinite lines of demarcation in which symptoms of hyperthryoidism in all or in part are present, the ordinary changes in the thyroid gland which we are accustomed to see in hyperthyroidism not being apparent to the clinical observer.

There can be no doubt that the use of the thyroid gland as a medicinal agent is very greatly abused, as indeed is the use of all the other endocrine glands which have been introduced as medicinal agents, and it is abused either because the physician has not a clear conception of the conditions which are known as hyper- and hypothyroidism, or because he gives it when at his wit's end for a remedial agent, hoping that it will do good, and failing to recognize that doses which are capable of producing an effect may do harm.

In normal individuals, so far as thyroid function is concerned, the administration of moderate doses of thyroid gland probably does not produce permanent deleterious effects, but in those whose thyroid is abnormal the use of this substance may not only induce conditions which are tempora-

rily undesirable, but do actual harm by still further disordering metabolism.

The question then naturally arises as to what steps can be taken on the part of the physician to make his administration of the thyroid gland less empirical and more rational. Unfortunately, the answer is that it requires the employment of delicate apparatus of one form or another, all depending, however, upon one principle, which delicate apparatus must be used fairly constantly to maintain skill as to technique, which is comparatively speaking expensive, and which requires on the part of the physician and patient a very considerable expenditure of time. Unfortunately, the laity have not yet been educated up to the point at which they are willing to believe that an expenditure of time and money in the investigation of a pathological condition is absolutely essential. They still expect a snap diagnosis after they have described, more or less inadequately, their symptoms to the physician, and so the general practitioner is hampered on the one hand by the difficulties in applying certain tests and on the other hand by the obstruction afforded by the patient.

In this connection, an article which has recently been contributed to the *American Journal of the Medical Sciences* by Rowe on the "Value of Basal Metabolism Studies" is of particular interest to the general practitioner, because he succinctly sums up the value of such studies in different conditions which are met with in clinical medicine. After reminding us that the basal metabolism of an individual is the minimum chemical change resulting from the continuous organic cellular functions of the body which are essential to life, and that these chemical changes require oxygen, he once more reminds us that it is possible by measuring the oxygen consumption of the body, when at complete rest both as to muscular effort and digestion, to determine the minimum heat production or basal metabolic rate for the individual. At one time we depended entirely upon the use of the calorimeter for this purpose, but at present, by the use of various forms of the metabolimeter, the oxygen consumption of the body may be estimated.

Among the other functions of the thyroid gland it may be stated without fear of contradiction that it exercises a great influence upon this basal metabolism. If the thyroid gland is unduly active, the metabolic rate becomes abnormally high, and, conversely, if it is inactive, the rate falls below the normal. It is quite true that other glands, such as the pituitary and ovary, exercise an influence upon the metabolism, but nevertheless the thyroid is the dominant factor, and Rowe well points out that in cases of thyroid disturbance a proper investigation has not been made until the metabolimeter has been used. It is to be regarded in such cases as indispensable as is the Wassermann reaction in suspected syphilis, or the use of the thermometer in the presence of suspected fever.

This editorial is not the place for discussion of the various types of metabolimeters which have been placed upon the market. As we have already indicated they all require a considerable amount of technical skill and constant use to produce results which are reliable.

It is to be recalled that the clinician not infrequently meets with cases in which the question arises as to whether the patient's general health depends upon some neurosis, upon early tuberculosis, or some slight tendency to hyperthyroidism. It is manifest that in the neurotic cases and in the case of early tuberculosis the use of thyroid is not only not indicated, but contraindicated, and still more is it contraindicated if hyperthyroidism is present. So too in general terms it may be stated that the basal metabolic rate is not materially increased in the neurotic and in those suffering fom early tuberculosis, but is always increased if definite hyperthyroidism is present. While, therefore, this test in such cases does not control our use of thyroid gland, it does control the treatment in cases in which the thyroid has been suspected of

doing evil. Again, in the presence of a case of hyperthyroidism which is so manifest that it cannot be doubted, estimations of basal metabolism determine accurately, rather than by guesswork, the actual severity of the disorder. This point is of importance, because in some of the cases in which the symptoms are severe the metabolimeter shows that metabolic processes are not as greatly increased as one would imagine, and this in turn has an important bearing not only as to diagnosis, but as to treatment, because it would seem that those cases with marked symptoms, but comparatively moderate disturbance of basal metabolism, are much better subjects for operative treatment than are those with comparatively severe symptoms and disordered metabolism to a less degree.

Furthermore, such estimations can be utilized as a guide in the employment of *x*-ray therapy and radium therapy in the treatment of hyperthyroidism. Not only does this method tell us that one of these forms of therapy is producing a favorable effect, but it also tells us how frequently either one should be employed and when it should be stopped, for it is manifest that such active agents acting upon abnormal tissue possess strong possibilities of doing harm if used too freely. Rowe mentions a case in which so much gland was removed by thyroidectomy that the patient developed a basal metabolism far below normal, yet because he presented symptoms of weakness and nervousness he was supposed to be suffering from hyperthyroidism and the *x*-ray was employed to control the activity of the gland, when in reality secretion of the gland was too scanty. He promptly improved upon the administration of thyroid gland after the metabolimeter had shown that his basal metabolism was below par.

Still another use of the estimation of the metabolic rate is the determination of the toxicity of adenomas of the thyroid. As we have already pointed out, some of these adenomas produce no manifestations of hyperthyroidism, but others do so. If they are doing so, the question of operative interference naturally arises, whereas if the metabolic rate is normal it may be proper in many cases not to interfere with the adenomatous process. Again, such estimations are of value in determining the time of election of medical and surgical treatment. Where the metabolic rate is over +70, rest in bed, absolute quiet, or in other words the institution of a rest cure, has to be resorted to before thyroidectomy should be attempted. At most, ligation of one or more of the vessels of the thyroid should be resorted to at this time. It is, however, to be recalled, if the question of the use of the *x*-rays is debated, that they have been found of little value in hyperthyroidism associated with adenoma as compared with the results which have accrued from this case in ordinary hyperthyroidism.

So far we have discussed the use of metabolism tests in connection with hyperthyroidism. They are equally valuable as controls in hypothyroidism: first, in confirming the diagnosis if hypothyroidism is actually present, and secondly, in determining the results which are obtained by the administration of thyroid gland. In other words, the test guides the physician as to the frequency of the administration and as to the size of the dose of thyroid which he should give, and this is the more important because it is becoming increasingly manifest that dry thyroid gland or extract of thyroid gland, even when carefully prepared, varies very greatly in therapeutic activity, partly because the content of its active principle in the normal animal varies with the condition of the animal and also with the season of the year in which the animal is killed, and, therefore, a physician's experience to the effect that a given case should receive a certain dose of thyroid gland may have its value largely diminished if he uses the same weight of gland derived from a different animal from that the thyroid of which produced excellent effects in another patient.

The introduction of metabolimeters into

hospitals and clinics is constantly increasing, and where a physician has any doubt as to the points which we have raised in one of his patients he should certainly control his treatment and diagnosis by refering such patient for metabolic study in order that his therapy may not be haphazard or even harmful.

## THE EFFECTS OF HOT AND COLD APPLICATIONS TO THE SURFACE OF THE BODY.

The intention of this editorial note is not to deal with pathological lesions produced in deeply seated organs, or on the surface of the body, by the application of cold or heat, but to consider the question as to whether it is possible by such applications to materially influence the temperature of the muscles, liver, kidneys, and brain. Physicians for generations have applied heat and cold with the idea of influencing more or less deeply seated organs, but little real scientific research has been directed toward determining the actual effects which were produced, most of the opinions for or against such procedures being based upon clinical observation, in which there is a considerable element of error.

In a recent issue of the London *Lancet*, Macleod and Taylor report investigations which they carried out in the University of Toronto upon this question. In an earlier communication, along somewhat similar lines, they showed that the application of heat to the surface of the thigh in the rabbit caused an immediate rise in temperature, which spread laterally for about 20 mm. and penetrated into the muscles for about the same distance when the heat which is applied is approximately 10° C. greater than the natural heat of the skin. On the surface of the abdomen at a temperature difference of 15° C., the area covered being one-quarter of the abdominal surface, the temperature changes were induced to a depth of 75 mm. and the lateral spread was 20 mm. They proved that this rise in temperature is mainly dependent upon induction of heat through the tissues.

In the present research, when cold was applied 20° C. below the normal temperature of the tissues a fall of about 14° or 15° C. occurred under the applicator, the drop in temperature being very sharp at first, with a quick return to normal when the applicator was removed. It was again found that the lateral variation in temperature extended to about 20 mm. to 25 mm., which is in accord with that obtained with heat.

It is not possible for us to give the charts illustrating their studies with the somewhat exhaustive tables which they publish, but so far as the application of cold and heat to the surface of the body is concerned in its effects upon the liver and kidneys, they conclude that it is not possible to cause any significant change in temperature in these organs, although a somewhat different effect is produced by cold than by heat. Thus, when the cold applied is 20° to 25° C. less than that of the body the fall of temperature is quite marked in the case of the liver, but usually is insignificant in the case of the kidneys.

Possibly the most interesting and important observation which they made is in connection with the influence of heat and cold applied to the head on the temperature of the brain. They found that cold definitely influenced the temperature of this important organ, cooling it to a depth of 14 mm. when the cold applied varied from 7° to 10° C. below the normal temperature of the surface. When still lower temperatures were used, the fall of the brain temperature became very marked indeed, falling as much as 3° to 4° C. to a depth of about 14 mm., when the temperature was about 25° C. below that of the body. It is interesting to note that the application of heat to the head did not produce as great a temperature change in the brain substance as did the application of cold.

As Macleod and Taylor point out, these

facts have considerable importance from the therapeutic standpoint. It has been thought by some that the applications of cold to the head in the course of fevers acted either as a comforting agent by producing a pleasant sensation, or possibly modified the circulation in the brain reflexly through the nervous system, but the investigations to which we have just referred would seem to indicate that while these latter influences may be considered as factors, a very definite and direct effect can be produced through the scalp and bony structure upon the temperature of the brain, particularly by cold applications.

## REST AND EXERCISE IN TUBERCULOSIS.

It is one of the interesting things in connection with the mental processes of medical men, and indeed of all men, that they are prone to become enthusiastic in regard to a method which follows only one line and fail to recognize that different methods or lines must be followed if the conditions present are widely at variance. In the medical literature on tuberculosis there can be found almost as widely divergent views in regard to its treatment as can be conceived of by the human mind. There have been those who have insisted that absolute rest in bed is essential in every case of pulmonary tuberculosis, and there have been those who have been equally insistent that exercise is a valuable therapeutic measure unless the patient is so far advanced in the disease that exercise is impossible.

Something of the same condition of affairs has existed in regard to the climatic treatment of tuberculosis. At one time it was supposed that long sea voyages, or residence on islands which were so small that the patient might be said to be taking a sea voyage without the motion of the ship, was the best thing for the tuberculous individual. Following this came the vogue, still popular, that a residence at a high altitude was the best curative measure to be resorted to, and within recent years numerous clinicians have expressed the view that such high altitudes are not essential and that a great many cases of pulmonary tuberculosis can be successfully treated at home provided that they can have a life in the open air.

A little thought reveals the fact that there is much truth in all these points of view. The difficulty really lies in a failure to recognize the fact that tuberculosis presents in its course stages and conditions which are diametrically opposed to one another, so that in one case rest in bed is a *sine qua non,* while in another case more or less active exercise is infinitely better for the patient. For the class which gets the most benefit from a high altitude, exercise may be said in general terms to be advantageous. For those who are frail, poorly nourished, and susceptible to cold, resort to a climate like that of Madeira, at one time so popular, may be wise, and, again, where a very large area of the lung is functionally destroyed either by consolidation or by cavity formation, a residence at an altitude may be said to be contraindicated, certainly if the process in the lung is acute and equally certainly unless the other lung is so healthy as to be able to carry on the work normally done by both lungs.

A paper emphasizing these facts has recently been written by Edwards of Asheville. He points out very clearly that rest is without doubt essential in those cases which are in an acute stage, and who may be said to be suffering from the want of a rest cure so far as their general condition and nervous system are concerned. On the other hand, he recognizes that where the process is not active, and where it has been present for a long period of time, moderate exercise is often exceedingly useful. As a general rule it may be stated that febrile patients should not exercise, and, of course, it is essential that the character of the work to be performed should have a close relationship to the ability of the patient so far as strength is concerned.

The day has long since passed when the

physician can make a diagnosis of pulmonary tuberculosis and then order a sea climate or a high altitude climate or rest in bed according to his individual beliefs. Every case must be carefully studied as to its temperature range, condition of general nutrition, state of the heart and kidneys, degree of involvement of the lung and adjacent tissues, and not least, of the contents of the peritoneal cavity, before the advice of the physician can be given with any degree of wisdom. It is true that a rest cure may for a time, by making the patient consider himself bedridden from disease, produce an unfavorable effect upon his morale, and that permission to engage in some form of exercise or pursuit may on the contrary improve his morale, but in all of these cases the patient can be told that the object of his rest cure is to put him in such a condition of restored energy and healing that by a gradual process of upbuilding his physical and mental activities can be reestablished.

We think it regrettable that the rest cure, originally introduced by Weir Mitchell, should have been so largely limited by physicians to the treatment of what is commonly called "nervous exhaustion." Many years ago we pointed out in the pages of the GAZETTE that most typhoid fever patients could be best treated by the Weir Mitchell method, and we have no doubt that one of the advantages which is derived from cold bathing with associated friction and massage arises from the fact that these measures take the place of the muscular exercise induced during the Weir Mitchell cure by the use of the slowly interrupted Faradic battery and by the massage given by some one competent to administer it. To permit a tuberculous patient not very acutely ill to lie in bed without passive exercise or other measures designed to maintain nutritional processes results in having the patient, although he or she may gain in weight, more flabby and inert, and less competent in many instances to combat the infection than he was before, whereas by proper feeding and attention to the normal flow of blood and lymph some degree of restored vitality might be obtained by rest with a maintenance of general nutritional processes at an approximately normal level. In other words, there is really no debate as to the wisdom of using rest or exercise in the treatment of tuberculosis. Each of these remedial measures is proper according to the state of the patient, and each of them must be employed or modified from time to time as the patient advances, or recedes, during the progress or arrest of his infection.

## SECTION OF THE ANTEROLATERAL TRACT OF THE CORD FOR THE RELIEF OF INTRACTABLE PAIN.

There are few physicians who cannot look back to cases in which the problem was no longer one of probable, or even possible, cure, but lay in the direction of making the last remaining weeks or months at least bearable. Morphine with the increasing doses up to, indeed far beyond, the danger point was used, sometimes with complete success in so far as the pain was concerned, sometimes with partial success, and exceptionally with no result other than that of producing the undesirable effects of the drug. The terminal period, for instance, of a cancer of the prostate beyond surgical help thus became one of unmitigated horror.

It is on this topic that Leighton *(Surgery, Gynecology and Obstetrics,* September, 1921) writes. He states that the remedy for these distressing conditions is by such radical procedures as section of the cord, complete or partial; division of the posterior spinal roots; division of the posterior columns of the cord; section of the pain-conducting tracts in the cord above the level of the disease; and extradural operations on spinal roots or ganglia.

What does surgery offer? Thanks to the neurologist several measures have been advocated. Although section of the cord has been suggested as a last resort in lesions producing unbearable pain, one can hardly

conceive such a measure actually carried out with all the outcome which a complete paralysis would bring. Division of the posterior roots of the spinal cord for the relief of pain was first suggested by Dana in 1888, and Abbe was the first to report the operation. Since this time numerous root resections are on record, and although the operation would appear theoretically sound many failures to attain the desired result have been reported. In 1900, Mingazzini proposed the operation for gastric crises and lancinating pains of tabes. But it was not until 1908 that Foerster first reported the operation for this disease. The result of operation in a large series of these cases has not been entirely satisfactory. In 1910 A. Schuller suggested that as a substitute operation partial division of the spinal cord might be employed, instead of section of the posterior roots for spasticity either alone or with the direct cerebellar tract; the anterolateral column might be cut for gastric crises.

A notable contribution to this subject was made by Spiller in 1912. He proposed employing the method of dividing the anterolateral tract of the cord for the relief of persistent pain of organic origin independent of gastric crises, and with Martin published the result of the first case illustrating this procedure. The operation was performed by Martin, January 19, 1911. Since then the operation has been performed by Beer, Foerster, Elsberg, and Frazier, who recently published his results in six cases.

Leighton gives a brief abstract of ten cases, six reported by Frazier. The relief of pain was accomplished in all these cases. Frazier suggests that the fourth, fifth or sixth thoracic segment be selected, as this level would be appropriate not only for the relief of pain in the lower extremity but for the relief of gastric crises.

Removal of two laminæ is as a rule sufficient for the proper exposure of the cord. The dura having been opened the dentate ligament is identified, grasped with a mosquito forceps, and severed from the dura. Traction on this ligament will rotate the cord so that the anterolateral tract may be readily exposed. A small von Graefe knife with its back toward the dentate ligament is inserted just in front of the ligament and passed to a depth of 2.5 millimeters and brought out behind the origin of the anterior roots, making an incision approximately 2.5 millimeters deep by 3 millimeters wide. The section may be unilateral or bilateral, depending on the nature of the lesions. Bleeding is usually slight following the section. A stovaine block may be employed previous to the section by placing a pledget of cotton saturated with 0.4 stovaine solution on the cord above the level of the section. Following the section the dura is closed and the laminectomy wound sutured in layers.

Leighton reports four cases and believes that the operation will produce a permanent relief in any lesion below the thoracic level. He would add to the operation section of the posterior nerve roots which are present in the field, as this would destroy sensory impulses which reach to a higher level and are not touched in the section of the anterolateral columns, since this section includes only pain impulses which have crossed below this level.

The researches of Head and Pilz would seem to show that pain and temperature fibers require four to six segments for their complete crossing in the cord. The removal of four laminæ instead of two and removal of four posterior roots would bridge the gap not included by the section of the anterolateral columns. A bilateral operation should be done in all tabetics, in inoperable tumor of the cord, or in such cases as reported by Beer of metastatic pelvic tumors.

The advice of Spiller that the incision of the cord might be carried forward, including the anterior horn or motor root in the thoracic region, would appear to be a good one as little harm could be produced by it. The greatest danger is in cutting posteriorly and thereby injuring the pyramidal tract.

## A CHEAP AND EFFICIENT HAND DISINFECTANT.

As an instance of the force of habit, it is worthy of note that though bichloride of mercury has been proven of far less antiseptic value than other agencies and more easily rendered inert, its use as a hand wash has in many clinics been regarded as the essential part of this process for years, and is still so regarded to-day. For a while, and in a few centers, it was supplanted by oxalic acid and permanganate of potassium. In other clinics, lysol, creosol, and other germicidal agents were used, each possessing its peculiar advantage.

In a few, of the more conservative type, where even rubber gloves were regarded as unnecessary, a rigid application of soap and water was considered as adequate in so far as the hands or the surface of the skin were concerned.

In the present day there is no universally accepted method of surface cleansing, although perhaps major dependence is placed upon sterile water, soap, and mechanical cleansing; this being continued for some five to ten minutes beneath a running stream, followed by the application of alcohol, about sixty per cent, and as a rule by some antiseptic regarded as more potent.

In the interest of a prompt, complete, and fairly lasting disinfection of the hands, Conover and Laird *(American Journal of Public Health,* September, 1921) conducted a series of experiments which seem to have resulted in a method, simple, cheap, unirritating, safe, and efficient. They consider that in order for a substance to have value as a germicide, as applied to hand disinfection, it must possess all of the following properties:

"The product should be readily available, and either be on the market at present or placed on the market with little or no effort; be accessible in rural districts as well as in towns and cities; be already known by the medical profession and laity; and to have some former use, whereby the public would be acquainted with its use and relative safety or dangers dependent thereon. The product should be very inexpensive, so that the cost would not make its use prohibitive. It should possess warning signals, either natural or artificial, to indicate that it is not intended for consumption, and to prevent individuals from mistaking it for medicinal substances intended for internal use. And, in addition to these danger-signals, it should be relatively free from toxic action, either from absorption through the skin or in case of accidental consumption. The preparation should be relatively stable in the original packet against time, climatic conditions and other physical agents with which it would come into contact during its passage from manufacturer to consumer. It should exert an almost instantaneous action when applied as a germicide, owing to the practice of attendants hastily washing the hands and the inability of individuals to estimate time, or their unwillingness to hold the hands long in an antiseptic solution. There must be an absolute lack of any production of irritation to the skin from repeated or continuous use of the antiseptic, and notwithstanding all of the above properties it must not be unpleasant to use, because this property alone would suffice to prohibit the free and proper use of the preparation."

They find that a mixture of equal parts, by weight, of chloride of lime and boric acid ground to powder, and stored in paraffin paper to prevent loss of chlorine content, will, if added in the proportion of three grammes of the mixture to one liter of water, guarantee disinfection of the hands. These amounts can be approximated by adding one level teaspoonful of the powder to a quart of water, nor is it necessary to use other than tap-water. The solution should not be employed for more than thirty contacts, nor be used after standing two or three hours in an open vessel. Owing to the action of chlorine on metals, the solution should be placed in a porcelain or enamel vessel.

The length of time required for disinfection is but a few seconds, fifteen being

the shortest period tested and proven of value; to be absolutely safe the time of contact should be one minute, this period being of sufficient length to insure thorough cleansing of all infected surfaces.

The tests to which the authors subjected this solution were sufficiently severe: after thorough infection the hands were washed without the use of gauze or rag of any kind, for one minute and a test taken. The disinfection was complete excepting beneath the nails.

# Progress in Therapeutics

## Medical Therapeutics

### Endemic Goitre: Its Prevention and Treatment.

In an editorial on this subject in *Endocrinology* for July, 1921, it is stated that there are regions in which a high frequency of enlargement of the thyroid gland is observable in the population and that this is a matter of common knowledge. In this country the Great Lakes goitre belt has long been known. A recent statistical study by Levin of the incidence and distribution according to sex and age of one portion of this district is of more than passing interest when correlated with the results of Marine and Kimball on the prevention of goitre in another part of the same general territory. Levin examined, without selection, 1783 persons and found thyroid enlargement in 1146 of the group coming under observation. That is to say, a trifle over 64 per cent of the population showed evidence of an actual or potential pathological condition of the thyroid.

The simpler goitre incidence, which Levin is inclined to attribute more to a physiological response to an unfavorable environment rather than to an immediate pathological state, though he points out that such enlargements tend to develop into actual pathological conditions, is by far the highest in the three groups into which he classifies the cases with enlarged thyroids. Some 38 per cent fall into this group, while of the residual 26 per cent the adenomas and cystomas together contribute nearly 24 per cent, and the colloid goitres the rest. In all three of the groups the incidence for the male is markedly lower than for the female. The incidence curve for age indicates that the number of persons developing goitre increases for both sexes during puberty, and drops to a lower level after the growth of the individual is attained. The curve for the female, however, remains at a high level during the child-bearing period, goes down at about thirty-eight to forty years, and rises again at the menopause. In the male the curve gradually drops till thirty-five or forty years, when there is a small increase in incidence.

The studies of Marine and Kimball are of immediate practical interest, in that they point the way not only for prevention of this high rate of incidence and its possible pathological sequelæ, but also because statistical evidence is given that even when the enlargement is an accomplished fact adequate treatment can be instituted which in a large number of cases results in improvement or cure. These investigators made a study of the pupils in the fifth to eighth grades of the Cleveland schools and found that goitre may be prevented simply and cheaply in normal individuals merely by the feeding of two grammes of sodium iodide daily for a period of two weeks twice yearly. They observed that of 2190 pupils taking this dose, only five developed an enlargement of the thyroid, while of 2305 pupils not taking the salt, 495 showed an

enlargement of the gland. Moreover, when 1183 pupils who showed a thyroid enlargement at the first examination were treated with the drug, 773 of them presented a decreased enlargement at the second examination, while of 1048 pupils with thyroid enlargement at the first examination who did not take the iodide, but 145 were found to have had a decrease in the size of the gland. The authors go on to state that in the practical application of the treatment there must be kept in mind the three periods when simple thyroid enlargement most commonly occur—fetal life, puberty, and pregnancy—and that prevention of goitre in mother and fetus is as simple as it is for adolescents.

Such studies admirably serve to demonstrate the value of the statistical treatment of facts, since they allow the drawing of valid conclusions as to the efficacy of any particular therapy in the treatment of a given actual or potential pathological condition. They are particularly valuable in this case in that they apparently make possible the prevention and treatment of endemic goitre wherever it occurs, providing of course its etiology is the same as for the Great Lakes region.

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### The Effect of Arsphenamine on the Kidneys and its Therapeutic Results.

ANDERSON, in the *American Journal of the Medical Sciences* for July, 1921, summarizes his paper on this subject as follows:

1. Because of its extensive use at present it is highly important that we know more perfectly the effects of the prolonged use of arsphenamine on the kidneys.

2. Kidney functional tests on 39 cases after they have received thirty doses of arsphenamine, each dose consisting of 4.6 decigrammes, and distributed over a two-year period, fail to give any conclusive evidence of injury to the kidneys.

3. The efficiency of any method of treatment must ultimately be determined by the Wassermann reaction. It is more trustworthy to use at least two antigens; the acetone insoluble antigen is a safe guide to diagnosis, and the alcoholic extract reënforced by cholesterin is an excellent guide to treatment.

4. It is impossible to say how much arsphenamine and how many courses of mercury may be necessary to produce a negative Wassermann reaction in any given case.

5. Six injections of arsphenamine and one course of mercury, the amount too often prescribed by certain groups of physicians, may produce one negative Wassermann reaction, but the average case of secondary or tertiary syphilis will require twelve or more doses of arsphenamine and a corresponding amount of treatment with mercury to produce a negative Wassermann reaction, and one which only with further treatment may reasonably be expected to persist.

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### The Parathyroid Glands.

BOOTHBY, in *Endocrinology* for July, 1921, states that our knowledge regarding the function of the parathyroid glands may be summarized as follows:

1. In many species of animals the removal of all parathyroid tissue causes death from tetany, within a few days in most instances; the herbivora are less liable to tetany than the carnivora; age appears to have a definite influence on its frequency and severity, as probably also do pregnancy and lactation. There is some evidence of late trophic changes in those animals that survive parathyroidectomy and have few or no tetanic symptoms.

2. The preservation of very small amounts of parathyroid tissue prevents or renders the tetany less intense.

3. From the evidence at hand the function of the parathyroids appears to be distinct and separate from that of the thyroid; their only relationship seems to be anatomic and not functional; the parathyroids are not embryonic thyroid tissue.

4. There is evidence that their function is in some way concerned with calcium or guanidin metabolism, or with both; they

may play some part in the regulation or maintenance of the acid-base equilibrium in the body.

5. The experimental evidence pointing to the parathyroids as the primary cause of idiopathic tetany, unassociated with operative procedures on the thyroid, is very limited.

6. The only definite clinical entity which has yet been proved experimentally to be of parathyroid origin is the tetany occasionally seen after operations on the thyroid. In these conditions calcium in large doses usually ameliorates the symptoms. The reports as to the benefit obtained by parathyroid transplantation or feeding are not convincing.

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**An Evaluation of the Allen Method of Treatment of Diabetes Mellitus.**

In the *American Journal of the Medical Sciences* for July, 1921, WILLIAMS states that the question which first presents itself to the new diabetic is, "Is it worth the sacrifice and effort?" This must be the question uppermost in the minds of physicians in general practice who see only an occasional case. There is not the slightest doubt about the immediate value of the treatment. No procedure in medicine of which Williams has knowledge gives more spectacular relief than does the institution of this method in the acute stages of untreated diabetes. He has witnessed many patients, practically moribund, temporarily saved from impending coma and death by its use. The ultimate value of the treatment has yet to be determined. Since he has had the good fortune to treat patients along the most approved lines since it was first proposed, and has had a large number of cases constantly under observation, he tries to answer the following questions:

1. Does the method ever restore the diabetic to health with power to use unlimited quantities of blood?

2. Can severe cases always be kept from failing by rigorously following the method?

3. Does the method of undernourishment improve the physical condition of the diabetics enough to make the sacrifice and expense worth while, or does it merely increase or prolong the misery occasioned by the disease?

4. Does the use of the Allen treatment add materially to the expectancy of life of the diabetic?

To the first question as to the possibility of a complete cure and the use of an unlimited diet the answer is that it is highly improbable. He has seen several mild cases apparently become able to eat temperately of all kinds of food, even cane-sugar. One case in particular was that of a physician who on admission had a blood-sugar level of 0.25 per cent on a slightly restricted diet. At the present time, and after a lapse of three years, his blood-sugar is normal and he is eating a general diet, including cane-sugar, although it should be admitted that his eating habits are temperate. Many mild cases, particularly adults, have gained so much in tolerance that they are able to eat with discretion all kinds of ordinary foods except cane-sugar. He has never seen severe cases make such notable gains.

In answer to the second question, as to whether or not severe cases can be kept from failing, it may be said that many can be kept alive, although it may be necessary to constantly readjust and maintain the diet at levels exceedingly low. For example, he has had such a case in a young man whom he has been treating jointly with Dr. Allen. His diet is rarely permitted to go above 650 calories. He has had bad cases live for more than two years on diets averaging below 700 calories. A certain number of cases will succumb in spite of all fasting and underfeeding, as will be seen in the tables which are given in his paper.

The third question as to whether or not the condition of severe patients is improved sufficiently to make the undernutrition ordeal worth while, he thinks can truthfully be answered in the affirmative. If patients properly regulate their daily activities so as not to exhaust themselves they can live with a fair degree of comfort and with

greater freedom from symptoms for a much longer time than if treated by any other method of which he has knowledge.

The fourth question as to the gain in expectancy of life is a very difficult one to answer in terms of precision, and for several reasons. In the first place one must compare a given set of cases treated by the method with a similar group treated by older or former practices. To do this with any assurance of accuracy is quite impossible. (*a*) Included in all former studies on diabetes as before mentioned, because of inefficient methods of investigation, there must be many cases, particularly those of mild or uncertain form, which were not true diabetes; (*b*) there is great variation in the severity of diabetes in different individuals and a corresponding variation in prognosis—therefore only cases of similar degrees of severity can be fairly compared; (*c*) a large proportion of diabetics have complications or associated diseases which are frequently the cause of death; obviously only groups of cases of uncomplicated diabetes can be compared.

Secondly, a large proportion of those who succumb to diabetes under the Allen treatment are not faithful to the method, as shown by his tables. Most of them are unwilling to continue under the limitations and privations which it imposes, and rarely follow it for more than a few weeks.

In spite of all these disconcerting factors, from careful observation one gains a distinct clinical impression that life is materially lengthened by the treatment. Curves plotted so as to show the average duration of life of fatal cases arranged according to age of onset and duration of disease between 408 fatal cases treated by Joslin prior to December 1, 1915, and 103 fatal cases treated by himself since 1915, show that life has been prolonged from one to two years in most of the age groups.

Children when seen at the onset of diabetes, even when severely ill, may be greatly relieved for several months, oftentimes for upwards of two years. There may be noted, however, a gradual decline in the ability to use food. If the diet be constantly reduced to keep the blood-sugar within normal limits, the child will get along fairly comfortably for several months more, provided it does not succumb to some other disease or until tropic disturbances and evidences of malnutrition become distressing. Even under these conditions children may live for four or five years. It is his judgment that the length of life of the average diabetic child is doubled by the Allen treatment.

Young adults do somewhat better than children. In many cases the tolerance for food slowly declines in spite of the most rigid restrictions; others do fairly well; but he has seen very few cases which justify the hope that anything approaching a normal tenure of life or physical well-being will ever be attained by this unaided treatment.

Older adults, as would be expected, do correspondingly better. A large proportion of his living cases are in good health and many of them undoubtedly will live out a normal expectancy.

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### The Basal Metabolic Rate in Hyperthyroidism.

BOOTHBY, in the *Journal of the American Medical Association* of July 23, 1921, states that until recently adenoma with hyperthyroidism has been confused with exophthalmic goitre, which is another pathologic condition of the thyroid gland, consisting of diffuse parenchymatous hypertrophy, symmetrically involving the entire gland. Clinically, exophthalmic goitre, like adenoma with hyperthyroidism, is characterized by an increased basal metabolic rate, and therefore both diseases have in common the symptoms due to the increased rate. However, exophthalmic goitre has a different clinical course from adenoma with hyperthyroidism, and, in addition, certain peculiar and characteristic symptoms, one or more of which are present in varying degrees, such as exophthalmos, thrills and bruit, tendency to gastrointestinal crises, and a peculiar type of nervousness. That we are

dealing with two entirely distinct diseases in exophthalmic goitre and in adenoma with hyperthyroidism has been proved beyond reasonable doubt by Plummer, by the difference in the mode of onset of the two diseases, the clinical course and duration of the symptoms, the physical findings, and, finally, the difference in the pathology of the thyroid gland. The differential points in the two diseases are strikingly shown in the tables which he gives. To account for these differences, the most probable hypothesis is that in exophthalmic goitre not only are the thyroid cells producing an excess of thyroid hormone, but also the secretion so formed has some abnormal and peculiar chemical properties that produce the symptoms that differentiate it from pure hyperthyroidism. Kendall has suggested that probably there is, in exophthalmic goitre, a slight alteration in the structure of the thyroxin molecule.

The delay in the recognition of adenoma with hyperthyroidism as a disease distinct from exophthalmic goitre has been due in part to the fact that it was not at first recognized that small isolated areas of hypertrophic cells, such as may be found in some adenomatous thyroids, do not produce the clinical syndrome of exophthalmic goitre, and conversely, that diffuse parenchymatous hypertrophy may develop in a gland in which adenomatous tumors are incidentally present.

Aside from the academic interest in differentiating adenoma with hyperthyroidism and exophthalmic goitre, the diagnosis is of great clinical importance because the times of onset, duration, course, and outcome are different; furthermore, the operative programme is not the same in these two diseases. In adenoma with hyperthyroidism the operation is directed to the removal of the tumor, while in exophthalmic goitre the surgical procedures are planned to reduce, in the severer cases, the overactivity of the diffuse parenchymatous hypertrophied thyroid by successive steps: first, hot-water injection; second, one or more ligations; and, finally, one or more partial thyroidectomies. In adenoma with hyperthyroidism, preliminary ligation of the blood-vessels is seldom of benefit even in the severe cases, while in exophthalmic goitre the benefit from ligation is usually quite marked. Simple enucleation of the adenoma is almost invariably sufficient to cure the patient suffering from adenoma with hyperthyroidism; on the other hand, extensive resection of the greater part of both lobes and the isthmus is necessary to reduce the activity of the hypertrophic parenchymatous thyroid of exophthalmic goitre within normal limits, and not infrequently a second and occasionally a third resection are necessary before the intensity of the intoxication is brought within the bounds of safety. The effect of operative treatment is illustrated in one of his tables.

It is well known that the course of exophthalmic goitre proceeds in cycles of intensity with intervening periods of partial and occasionally total remission. Experience has shown that the dangers of any operative interference during the rising curve of intensity and at the peak, especially if associated with gastrointestinal crises and loss of weight, are greater than during the stage of improvement. The curves of the basal metabolic rate in conjunction with the loss or gain in body weight of the patient are valuable mathematical expressions of the intensity and phase of the intoxication cycle. He has been unable to prove that the Roentgen ray definitely influences the natural course of exophthalmic goitre.

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### The Treatment of Tuberculous Adenitis by Roentgen Rays and Radium.

In the *American Journal of the Medical Sciences* for July, 1921, Boggs, in concluding his paper, states:

1. Radium and Roentgen rays will cure more cases of tuberculous adenitis than any other method. Radiotherapy alone will cure over 90 per cent of these cases.

2. Surgical treatment is always contraindicated primarily in every case of tuberculous adenitis.

3. Those who still hold to radical operation will find the responsibility harder to shoulder with the ever-increasing recognition of the fact that tuberculous adenitis can be cured without it.

4. Hard, fibrous nodules following radiotherapy seldom contain any tuberculous foci, but it may be advisable to remove these nodules through a small incision the same as a foreign body.

5. It is to be remembered that large cervical glands may be due to sarcoma, Hodgkin's disease, leukemia, etc., and that radiotherapy is still the best form of treatment for multiple glandular tumors, but the end results are not the same as when the enlargement is due to tuberculosis.

6. In the treatment of tuberculous adenitis in the future, when a more systematic raying is employed and when the cases are referred earlier, this method of treatment will be universally accepted.

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### The Treatment of Toxic Goitre by Radiation.

In *Southern Medicine and Surgery* for August, 1921, LAFFERTY states that the treatment of toxic goitre must be either surgical, medical, or radiological. The consummation devoutly to be wished is the curtailment of the activity of the gland, and to do this we must first recognize that the thyroid is but one link in the chain in which the thymus, suprarenal, pituitary, and parathyroids, gonads, and possibly others of the internal glands, one or more may play an important part.

In many cases if recognized early and the treatment pursued faithfully the medical treatment will have the desired result. Musser concluded an article just before his death on the management of goitre by saying: "Finally my conviction is that the surgeon does too much and the internist too little in the treatment of goitre." And Lichty, in quoting him, adds that "the internist does his 'little' too late." The medical treatment supplemented by *x*-ray or radium has a very beneficial effect and in the majority of cases produces a cure. Since 1905, when it was first recommended, the *x*-ray has been used in a vast number of cases and the literature is replete with favorable reports. Means, in 1920, says: "My feeling is that our results have shown that it is always wise to employ the *x*-ray first, with the idea that the chances are good that it alone may cure, and if it does not it will reduce the risk of subsequent surgery." Holmes in comparing the results obtained at the Massachusetts General Hospital by surgery and the *x*-ray, as shown by the basal metabolism, concludes that the normal condition is produced equally by both and that the length of time required to produce a cure is about the same.

Lafferty does not for one moment decry surgery, but he does urge the reservation of this valuable agency for cases demanding it. For example, the cases in which *x*-ray is contraindicated are those in which there are no toxic symptoms, the cystic, colloid, fibrous and nodular types, the intrathoracic goitre, and those causing pressure. Means and Aub say that if rest and Roentgen ray fail to restore the metabolism to within 20 per cent of normal it is proper to consider surgery unless there be some contraindication. Many of the leading surgeons recommend the radiation before surgery, either in the effort to cure or to make operation safer, and in these cases, as indeed in all cases of thyrotoxicosis, it is very important to cover the thymus region. In cases having relapse after surgery radiology is the only resort. At the Mayo clinic they only treat the recurrences and claim excellent results. Stevens reports 90 per cent of cures by radiation.

Often the question is asked as to the danger of the treatment by *x*-ray. There are certain dangers recognized even in very careful treatment by experienced roentgenologists. In severe cases the toxemia may be increased by too large a dose in the first treatment and by the exertion of reaching the treatment room. This can be avoided by making the first dose light and by requiring the patient to keep quiet sev-

eral hours before and after treatment. In very extreme cases radium would be the choice, since it can be applied to patients while in bed and with no exertion on their part. The danger of telangiectasis is slight, but by proper treatment and filtration this can be avoided. The danger of producing hypothyroidism is also to be remembered, and the case watched closely and treatment stopped before a complete cure is produced, for the effect of the treatment continues for some time after the last application of the ray. The estimation of the basal metabolism is of special value in avoiding this. So all told, while just as in surgery there are dangers, certainly they are less severe and more easily avoided.

As a rule the first symptom to disappear is the nervousness and sleeplessness, and this is generally followed by the improvement in the circulatory system, though occasionally the order is reversed. Then gradually the other symptoms disappear except the tumor and the exophthalmus, which leave slowly, if at all.

He concludes: Medical treatment (including, of course, all hygienic measures) accomplishes results if used very early, but the effects are greatly augmented by the use of radiation. Surgery will give the results, but should, as in other conditions, be reserved as a last resort. Radiation is invaluable as a preoperative measure in extreme cases.

Finally, radiation should be used since it does give relief and generally a cure, and since if used properly no harmful results are obtained; it does not in any way preclude surgery later if it is found that the case does not respond to radiation.

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### Study of Transfused Blood in Pernicious Anemia.

ASHBY, in the *Journal of Experimental Medicine* for August, 1921, states that evidence is presented to show that there is no hemolytic toxin producing the anemia in pernicious anemia.

Partial evidence is presented to show that the periods of active blood destruction which are seen as the exception in pernicious anemia cases during a series of transfusions are due to the activity of the blood-destroying organs of the body rather than to the intrinsic weakness of the pernicious anemia blood-corpuscle.

It is questionable whether blood destruction is as important a factor in producing the anemia of pernicious anemia as it is at present usually assumed to be.

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### Thyroid Secretion in Blood of Individuals with Exophthalmic Goitre.

ROGOFF and GOLDBLATT, in the *Journal of Pharmacology and Experimental Therapeutics* for July, 1921, state that blood was obtained from thyroid glands of ten individuals upon whom thyroidectomy was performed for exophthalmic goitre, three for thyroid adenoma and two colloid goitre, and tested for the presence of thyroid secretion, utilizing the "tadpole reaction." No evidence was obtained, in any of the specimens, of the presence of active thyroid material in the blood.

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### Chronic Meningococcus Septicemia.

MORGAN, in the *Bulletin of the Johns Hopkins Hospital* for August, 1921, states that every effort should be directed toward the immediate sterilization of the blood stream before the infection has had time to become localized in the meninges, and thus give rise to an acute cerebrospinal meningitis.

Once the diagnosis is made, intensive intravenous antimeningococcus serum therapy should be started, due precautions against untoward serum reactions having been observed.

The question of subthecal treatment is an important one, and has been discussed at length by Ribierre, Herbert and Bloch in their article on this subject. According to these authors there are two definite indications for intraspinous serum therapy: (1) Evidence suggestive of meningeal local-

ization of the organism—that is, signs of meningitis (increased irritability, rigidity of the neck, Kernig's sign, increased reflexes, an increased cell count in the cerebrospinal fluid, or the recovery of the organism from the fluid). (2) Cases which do not respond promptly to treatment solely by the intravenous route.

Under the first group fall two classes of cases: (*a*) those with frank signs of an acute meningococcus meningitis; (*b*) those with only slight or inconspicuous evidence of actual meningeal infection. The former should be treated as ordinary cases of cerebrospinal meningitis, the major therapy being directed to the local condition (*i.e.*, the meningitis). Here, as in the epidemic form of the disease, the usual occurrence is for the bacteremia to disappear with the development of the meningitis. However, should the meningococcemia persist, both intravenous and subthecal administration of the antiserum is indicated. In the second type (*b*) headache, photophobia, slight muscular rigidity, a suggestive Kernig's sign, and somewhat heightened reflexes may occur. The cerebrospinal fluid is clear and its pressure not greatly increased. The cell count may be high (30 per c.mm. in his case) but the cells are mainly lymphocytes. A positive globulin test may be present. The fluid, however, is sterile on culture. It is this combination of clinical and laboratory findings that has led to the assumption by some observers that the primary focus of the infection is situated at a point in close proximity to the central nervous system. They do not, however, regard these phenomena as evidence of an actual meningeal infection. Regardless of the cause, the therapeutic indications seem clear in the presence of these findings. Such patients should be treated by subthecal injections of the antiserum, either as a curative or a prophylactic measure.

A few uncomplicated cases in the literature have responded very slowly to the intravenous treatment alone, and it is urged by members of the French school that they be treated intraspinously as well, even in the absence of any evidence of meningeal irritation. These authors base their reasoning on the belief that the focus from which the organism is disseminated into the blood stream is located near the central nervous system, and that intraspinous therapy together with intravenous therapy offers the logical approach to this focus. Although this question did not arise in the treatment of Morgan's two cases (one having developed a frank meningitis, and the other showing evidences of meningeal irritation, before specific serum therapy of any sort was instituted), no hesitancy would have been felt in resorting to the intraspinous route as an aid to the treatment of pure meningococcus septicemia without central nervous system manifestations.

The treatment of complications of the disease other than the meningitis is not discussed in this paper.

Authorities urge the immediate classification of the organism (normal, paranormal, or irregular; Type I, II, III or IV of Gordon; Type A, B or C of Nicolle) in order that monovalent serum may be used. When delay occurs in determining the type, temporary treatment with a polyvalent serum may be instituted. In both of the cases here reported (one an infection with a "normal" and the other with a "paranormal" strain) the monovalent serum treatment was not feasible at the time. Satisfactory results were obtained by the use of a polyvalent antimeningococcus serum furnished by the New York State Board of Health.

Daily intravenous injections of from 20 to 40 Cc. of serum are advocated. In most of the reported cases from three to five treatments sufficed. When intravenous treatment is contemplated, an equal amount may be given by this route.

Ribierre, Herbert and Bloch advocate the following procedure in the treatment of an uncomplicated case of chronic meningococcemia: Type the causative organism immediately, and use the specific antiserum as soon as possible. Until this is available a polyvalent serum should be employed. The treatment is begun with the daily injection

of 40 Cc. of antimeningococcus serum on one day subcutaneously and on the next intramuscularly, until five treatments have been given. If no immediate improvement results the intravenous route should be utilized. If this fails the serum should be given subthecally.

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### Types of Cases Unsuited for Citrated Blood.

In the *Journal of the American Medical Association* of July 23, 1921, BERNHEIM states that according to his experience there are apparently two types of cases which should not be given the citrated blood:

1. That in which there has been a hemorrhage of such intensity that the extreme limits of bleeding have been reached, and the patient is in such a state of shock that everything in the nature of additional shock must at all hazards be avoided.

2. Those states of anemia, either primary or secondary, in which the blood depletion has progressed to such limits that the patient is almost dead.

Not many months ago, early one morning, he was asked if anything could be done to save a man who had been given 500 Cc. of citrated blood four hours previously, and who was apparently dying from the reaction that had occurred. The case was one of the most profound exsanguination from bleeding of a duodenal ulcer. The man was conscious at the time of transfusion, but in the most critical state imaginable. He had had a frightful chill following the giving of the blood in spite of the fact that most careful preliminary tests by competent special laboratory workers had been made. The temperature rose to 105° F., the pulse became imperceptible, and he died from shock. That is an example of the first type of case which he has cited as unfit for transfusion with citrated blood. Those who are familiar with exsanguination, and the profound degree of relaxation of all bodily functions that accompanies it, which we call shock, will at once recognize the common sense in this statement that every means possible should be taken to avoid any additional shock. And since it is well known that whole blood gives rise to a reaction in but the smallest possible percentage of cases, it can readily be recognized that this is the method of election in such instances.

Two striking cases almost parallel with each other brought him to the foregoing conviction, and these cases are illustrative of the second type of case in which citrated blood ought not to be given. The first was an elderly woman who was having air-hunger, as a result of prolonged and exsanguinating bleeding from a uterine fibroid. He took time to make the usual tests, and then, in his ignorance, he gave her a citrate transfusion. She had a profound chill and died three hours later. The second was a younger woman who was so weak from prolonged and exsanguinating uterine bleeding of unknown origin that she was unable to talk above a whisper. The first case was vivid in his memory, and by that time he had begun to formulate his ideas of differentiation—so, fearing disaster from a possible reaction, he gave that girl a whole transfusion. She had no reaction whatever, and immediately took on renewed life. Two days later, feeling that she could stand the shock of a reaction and wishing to test out his incipient theory, he gave her the same amount of blood by the citrate method. She had a reaction, a most violent one; but as he had surmised, she was able to withstand it and came through. Her recovery was slow but uneventful.

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### Gland Puncture as a Diagnostic Measure.

In the *Bulletin of the Johns Hopkins Hospital* for August, 1921, GUTHRIE states that thus far there has been an opportunity to apply this method of diagnosis in cases of syphilis, tuberculosis, Hodgkin's disease, acute and chronic lymphoid leukemia, acute and chronic myeloid leukemia, simple adenitis, and in one instance each of

trypanosomiasis and of metastasis of malignant disease.

A positive diagnosis dependent upon the recovery of the etiological agent of the disease was possible in a number of the cases.

As is mentioned above, the finding of trypanosomes established the diagnosis in one patient with African sleeping sickness.

Actively motile treponemata were found in a goodly percentage of the luetic cases, particularly from punctures of the inguinal glands in the late primary or early secondary stage of the disease. The relatively high incidence of positive results is to be attributed largely to the selection of favorable cases, but in the main his findings agree closely with those reported by others.

Acid-fast organisms, morphologically indistinguishable from tubercle bacilli, were occasionally found in material aspirated from glands clinically tuberculous and later shown to be tuberculous by histological examination. They were found once in a caseous gland and twice in glands which were completely broken down inside, but which felt firm owing to the distention of the gland capsule by the contained pus. When pus was obtained, the syringe was filled and the aspirated material treated with antiformin. From glands which were neither caseous nor broken down, tubercle bacilli were not recovered.

Streptococci and staphylococci have been demonstrated in stained preparations from aspirated glands, but in the particular instances in which they were seen unfortunately no tubes were inoculated, so he cannot report having grown these organisms from material obtained by gland puncture. Streptococci were seen in one instance of subacute adenitis and were subsequently grown from the excised gland. Clumps of staphylococci were seen in the pus aspirated from a broken-down tuberculous gland, evidently a secondary infection.

The results obtained from the study of the cellular material aspirated from glands are perhaps more interesting.

In Hodgkin's disease it has been possible to make a definite diagnosis in all of the cases examined thus far. The presence of eosinophiles, large endothelial cells, and the peculiar multinucleated giant cells—the so-called "Dorothy Reed cells"—gives a characteristic and usually unmistakable picture.

In the cases of leukemia the gland picture has, to a remarkable degree, reflected the blood picture; such immature forms as were to be seen in the blood were also found among the cells from the gland, and hence little information was added by the study of the material obtained on puncture. It is possible, however, that if the blood were in an aleukemic stage and recognition of the disease consequently more difficult, puncture of a gland might yield information of considerable value in arriving at a diagnosis.

In simple adenitis the picture is one of lymphoid hyperplasia, as is evidenced by the presence of large numbers of lymphoid cells in various stages of maturity, plus the presence of polymorphonuclear neutrophile leucocytes, the number depending upon the acuteness of the process. As has been mentioned, microörganisms responsible for the condition may also be seen occasionally.

In only one instance was a gland punctured which proved to be the site of a metastasis of a malignant tumor. Clinically, the case resembled Hodgkin's disease, but the blood picture was not that usually seen in any stage of Hodgkin's disease, and the enlarged cervical glands, which had been treated by *x*-rays for a year, were very tender. The material obtained on puncture was very rich in cells, the majority of which were of enormous size, some with one and others with several nuclei, but practically all showing a vacuolated protoplasm. There were also multinucleated giant cells of a type quite different from "Dorothy Reed cells." Ordinary lymphoid cells were very scanty. Sections of an excised gland showed that all of the essential features of the picture had been observed in the puncture preparations. The diagnosis remains uncertain. Somewhat similar tumors have been seen arising from the nasopharynx

and occasionally from the adrenal. From the sections it is evident that the gland is involved by a malignant tumor assumed to be metastatic, although the site of the primary growth has not been discovered. Following treatment with radium the glands have decreased markedly in size and the tenderness has practically disappeared.

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**Use of Artificial Pneumothorax in the Treatment of Pulmonary Disease.**

PEERS, in the *California State Journal of Medicine* for August, 1921, states there are two general rules which can be laid down in the matter of determination as to the use of pneumothorax, but they are subject to certain exceptions.

1. No patient should be submitted to operation without first having been given the benefit of ordinary measures for two or three months or longer.

2. Pneumothorax should be attempted only when, as far as can be ascertained, the patient will not recover under the ordinary methods.

The reason for the first rule is that many patients, who might at first seem very suitable cases for pneumothorax, and many patients who are very far advanced, will secure an arrest and lose their symptoms under ordinary measures. Whether a patient recovers from tuberculosis or not depends to a very large extent upon his individual resistance to tuberculosis, and the patient's resistance is something which we cannot determine by means of any method of examination at present in our possession. There are certain dangers inherent to the production of artificial pneumothorax, and it is not fair to a patient to subject him to these dangers unnecessarily. Also, to be of value, lung compression must be continued over many months or even years, during which time the patient is more or less tied to his physician or to the neighborhood of the sanatorium at no little expense and inconvenience, and it is likewise unfair to the patient to create such conditions unnecessarily.

Broadly speaking, he would not allow artificial pneumothorax to be used on himself unless he had had a trial of other measures for two or three months without avail. There are, of course, exceptions to this rule, as in cases of alarming and uncontrollable hemorrhage or of a rapid decline in spite of the use of every other method of treatment.

The second rule, which is rather a modified way of stating the first, is that pneumothorax should be attempted only when, so far as can be ascertained, the patient will not recover under the ordinary methods of treatment. These are the patients, then, from which pneumothorax cases are to be selected, and in considering results one should bear in mind that every successful pneumothorax case means really the saving of a life which would be otherwise sacrificed. Even 5 per cent or, for that matter, 1 per cent of success, with 95 or 99 per cent of failures, would mean that the measure is justifiable, and the true percentage of success, which is much higher, as can be shown by statistics and by living patients, more than justifies its use.

All patients suffering from tuberculosis can be classified into three groups in their relation to pneumothorax and the advisability or inadvisability of operation.

Those in which operation is urgently indicated. These are cases of persistent hemorrhage, in which the bleeding is not controlled by rest and ordinary measures. Some of the most brilliant results are obtained in this class of cases. It is the one positive thing we can do for the control of pulmonary hemorrhage, and the physician who does not use pneumothorax in cases of otherwise uncontrollable hemorrhage is, in his opinion, not doing everything in his power for his patient.

There are what may be termed the cases of election. These are patients who are steadily going down-hill and in whom the tuberculous process is mainly unilateral. Such patients have one lung in which a large proportion or nearly all is relatively unimpaired and is capable of bearing alone the burden of respiratory function. Given

such a case, in which the pleural cavity of the diseased lung is not obliterated by adhesions, the change from continuous decline to convalescence is one of the most striking things with which the practitioner can come in contact. It is little wonder that the success in such cases led to unbounded enthusiasm and false claims.

There are what may be termed unsuitable cases. In this class are moribund patients; pneumothorax cannot resurrect the dead, early claims to the contrary notwithstanding. Into this group also fall those cases of advanced bilateral lesions in which there is not enough lung tissue in the relatively good lung to carry on the necessary work, or in which the activity is pronounced in both lungs. There is a limit beyond which one cannot expect beneficial results. Between the extremes of obviously suitable and just as obviously unsuitable cases there are many border-line patients in whom it is impossible to hazard a guess as to the probability of success. Every operator compresses many of these border-line cases with varying results. He does so for a number of reasons; sometimes because of the optimism engendered by previous success; sometimes at the earnest solicitation of the patient, and even against his better judgment; sometimes because of the pleading of relatives, who would try everything that would offer even the least hope in an otherwise apparently hopeless case. In such cases the physician has recourse to his experience and remembers those seemingly hopeless cases which have with time and care become arrested, and he pays heed to the dictates of his heart, which tell him that where he cannot heal it is his duty to comfort.

The complications which have been reported have been many. This being a report of personal experiences, he reports only those seen by himself. The most common complication is the presence of adhesions. When, as a result of previous pleurisy, a sufficient percentage of the lung surface is adherent to the chest wall and the pleural cavity cannot be located, the operation is a failure. Where the lung is partly adherent or bound down by a few dense adhesions, success or failure will depend upon whether the adhesions are so located or are strong enough to prevent sufficient pressure being exerted to immobilize the actively diseased tuberculous process. While one may form a fairly good opinion from examination and before operation as to the probability of the existence of adhesions, in the majority of cases the only real method of determining whether a compression is possible is by operation.

In a series of ninety-one consecutive cases, which he looked up in his records, he found that twenty-five cases, or 27.5 per cent, could not be compressed at all because of adhesions; thirty-two cases, or 35.1 per cent, could be only partly compressed; and that in thirty-four cases, or 37.4 per cent, he was able to secure complete compressions.

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**The Chemistry of Milk-curd Modification in Infant Feeding.**

TERRY, in the *Archives of Pediatrics* for August, 1921, in summarizing his paper, states:

1. The object in modifying cow's milk is due to the great difference in the physical condition of the curds from it and human milk.

2. The caseins from the two milks probably are identical.

3. Milk is coagulated by the combined action of rennin and calcium ions, each acting independent of the other.

4. Freshly formed curds have a powerful cohesive property, which property is rapidly discharged.

5. Diluting the milk with water modifies the curd by decreasing the concentration of the active masses.

6. Gruels or cereal decoctions act as protective colloids by virtue of the gelatinized starch present.

7. Sugars, except lactose, have little

action on the character of the curd. Lactose seems to favorably modify it.

8. Boiling the milk profoundly alters the character of the curd by the removal of calcium salts by scum formation.

9. Citrates modify milk-curd formation by fixation of calcium ions.

10. All alkalies act by precipitating calcium salts; thereby reducing the concentration of one of the active masses.

11. Sodium or potassium hydroxides are desirable modifying agents, but their purchase must be attended with care.

12. Lime water acts like all other alkalies by precipitating calcium. The curd from lime water has very desirable properties.

13. Milk and magnesia has practically the same effect on curd formation as lime water, but its action is slower.

No single method of modification produces the ideal curd. This can only be accomplished by a combination of dilution to the proper caseinogen concentration, the addition of a citrate to establish the correct calcium-citrate ratio, the adjustment of the mineral constituents, the addition of an alkali to reduce the acidity and properly stimulate gastric secretion, and by the addition of a protective colloid to establish the correct casein-lactalbumin ratio.

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**Studies in the Metabolism of Rickets.**

FINDLAY, PATON and SHARPE in the *Quarterly Journal of Medicine* for July, 1921, conclude:

1. Changes in bones, simulating somewhat those in rickets, can be caused by feeding on a calcium-low diet, but the condition is of the nature of osteoporosis and not true rickets.

2. The tissues other than bone in experimental rickets in dogs are not deficient in calcium.

3. The calcium content of the blood in experimental rickets in dogs shows no divergence from the normal.

4. No support is given to the view that rickets is due to a deficient supply of calcium to the bone.

**A Treatment of Gastric Ulcer.**

SMITHIES, in the *International Journal of Gastro-Enterology* for July, 1921, in giving an outline of his method of non-surgical treatment, sums up his views as follows:

Rest in bed—that is, both physical and mental rest—for from one to three weeks: both bodily and psychic activity are apt to stimulate peristalsis.

Physiological rest to the stomach itself, for when it is recalled that during an ordinary meal the digestive processes demand more than 2000 peristaltic waves, the effect of these waves as a mechanical irritant to an ulcer or the ulcer-bearing area cannot be disregarded. Complete rest for the stomach also demands avoidance of irritating medicine, gastric lavage, and frequent abdominal examination of the suspected focus.

Painful spasms are further prevented by having constantly applied to the abdomen compresses saturated with Ochsner's fluid (alcohol and boracic acid).

Keeping the stomach empty of food promotes healing by limiting local irritation from the food itself, by reducing the amount of gastric juice required to digest food, by limiting gastric peristalsis and avoiding painful gastrospasms, which tend to prevent free circulatory interchange. The abstinence from food by mouth should be insisted upon for from three to seven days, according to the case. The period of fast is determined best by clinical disappearance of gastric spasm (pain, regurgitation, waterbrash, heartburn) and by fluoroscopic proof of absent or diminished gastric peristalsis. During the fast paraffin wax is chewed for fifteen minutes every hour. It keeps the mouth clean, promotes free flow of protective saliva and mucus, counteracts painful hunger contractions and gastrospasms, and allays thirst.

During the fasting period rectal feedings are instituted. From 500 to 1000 calories of nutrient mixture are given in twenty-four hours. Smithies uses a clyster containing 1 ounce of 50-per-cent alcohol, 1

ounce of glucose, with normal salt solution to make 240 cc. The nutrient enema is given at body temperature by the drop method. The drops flow at the rate of 30 to 60 drops per minute. During the first day of rectal feeding, gtt. x of tincture of opium are given with each enema.

Mouth feeding is begun usually from the fourth to seventh day. Two factors control the choice of diet: (*a*) nourishment should be liquid and administered warm in small quantities, frequently; and (*b*) carbohydrates should be selected.

Small quantities of liquid food should be frequently administered in order that the stomach empty rapidly with the least effort and thus remain food-free for the longest time, thereby giving maximum time of rest for ulcer healing. The duodenal digestion must be called upon until gastric conditions warrant demands being made upon stomach digestion. Keeping the stomach food-free keeps hydrochloric acid or pepsin production at a minimum. From 4 to 6 ounces of warm liquid are given every hour. Where gastric irritability is very pronounced and the patient is in great need of food, carbohydrate mixtures may be given intermittently or constantly by means of a duodenal tube.

As experimental facts have established, carbohydrate foods leave the stomach most quickly. Therefore, liquid carbohydrate mixtures (barley water, rice gruel, thin cream of wheat, thin creamed vegetable soup, etc.) are fed. Milk is not given as routine. Milk results in almost pure protein clots in the stomach. These clots act as do other proteins and remain for a long time in the stomach as a source of irritation, as stimuli to acid secretion and as choice culture media for bacteria. If milk be given at all, it should be first parboiled or predigested.

Carbohydrate liquids produce the least demand on the stomach functionally, from either the secretory or the motor standpoint, and impose the minimum of work upon the duodenum. It should be recalled that the pylorus opens only when the duodenal contents are neutral or alkaline. If the gastric contents are of such nature as to impose slight demands upon the stomach secretions and motility, the duodenum has little work as a neutralizer to perform and the pylorus remains free from spasm and opens readily. There are thus avoided gastric stagnation and accumulation of free and combined acids, which stagnant mixtures may retard rest and healing, and which usually demand frequent lavage or the exhibition of large quantities of alkali.

Limitation of overproduction of gastric acid is obtained by keeping the stomach food-free as above described. This secondarily limits both the frequency and strength of gastric peristaltic waves, doubtless much more to be desired than acid limitation. Unless food leaves the stomach rapidly, gastric glands continue secretion and stress of gastric peristalsis upon the pylorus keeps up constant irritation of ulcer-bearing areas.

If the above points established by modern physiological research are borne in mind, the exhibition of large quantities of alkali or other medicines is unnecessary. Their use is certainly unscientific. If the gastric lumen is patent and the stomach empties freely, there is no stagnant, irritating residue. Large quantities of alkali, according to Pawlow and to his clinical and laboratory experience, create pernicious increases of gastric acid and of mucus and generally demand relief by lavage. Moreover, many gastric ulcer cases do not exhibit hyperacidity or hypersecretion. It is true that the stomach can neutralize large quantities of alkali if compelled to do so, but there is no physiological reason why it should be called upon to thus overwork, when physiologically secretory activity may be controlled by rest and diet. It will be remembered that the normal habitat of gastric epithelium is an acid or at the best a neutral medium. If these epithelial cells are called upon to live in an excess of alkali, they live, as it were, in the presence of a foreign body.

Experiments in artificial tissue growth have shown that cell proliferation is retarded by hypertonic alkaline solutions. Hence overalkalinization may actually prevent healing. Attempts at protection from this foreign body (excess alkali) are shown by the acid-producing glands oversecreting, and by the mucoid degeneration of physiological fatigue which results in the throwing out over the secretory glands of a protective layer of mucus. The vicious circle thus formed results in enormous secretion of acid and mucus, and is doubtless at least a partial explanation of the so-called hypersecretion associated with gastric ulcers, particularly when such are treated by the overalkalinization method. To combat this condition of affairs the patient's stomach must be washed frequently, or greater quantities of alkali must be given in order to overpower the stomach's defensive mechanism and produce fatigue or exhaustion of the acid-secreting mechanism. It is a common observation that those patients who are treated for ulcer by the overalkalinization procedure always require frequent gastric lavage in order to insure their comfort. This frequent lavage is to be condemned because it acts contrary to the primary requirement of healing, namely, rest of the affected part.

It is quite evident to those who have watched the behavior of a stomach by means of the fluoroscopic screen when a tube is inserted into it that gastric lavage defeats this primary principle of healing. Lavage is generally accompanied by vigorous gastric contractions that persist not only during the maneuver, but often for a long time afterward. If dieting is arranged on a carbohydrate basis, alkali is given in only sufficient quantities to keep the stomach slightly acid or neutral and thus aids in rapid neutralization of duodenal contents with conseqeut pyloric relaxation, so that gastric lavage needs to be instituted rarely during the entire course of a patient's treatment. In the past nine years Smithies has not employed lavage therapeutically in ulcer cases more than a dozen times. Lavage is so rare a procedure in his clinic that his associates and patients consider it as almost contraindicated. It is readily judged how a treatment of which lavage does not form a prominent feature contributes much to a patient's peace of mind and shortens the period of hospital incarceration.

It is doubtful if any form of medicine has a direct healing effect upon peptic ulcer. Medicines are administered largely to counteract discomfort due to three main causes, namely, painful gastrospasms, accumulations of overacid gastric contents associated with peristaltic unrest, pain associated with perforation or ulcer progression.

Painful gastrospasms are usually controlled by carrying out the dietetic principles already named. The chewing of paraffin wax relaxes the pyloric spasm largely through stimulating a proper swallowing reflex and by fatigue of hunger-like contractions. Certain types of cases in which there is an individual vagus hypertonia, or when ulcers are located at or near the orifices, demand the exhibition of antispasmodic medicines such as atropine, tincture of belladonna, or bromides. In the early stages of the treatment, when the stomach is being kept as free as possible of contents, atropine may be given hypodermically or tincture of belladonna or bromides may be placed in the nutrient enemata. Later, when food is being given by mouth, tincture of belladonna in doses of from 5 to 15 drops may be administered fifteen minutes before feeding from three to six times daily. He has not found useful, as analgesics, the exhibition of large doses of such so-called "protective" medicines as bismuth and olive oil. These medicines doubtless act by affecting the rate and intensity of peristalsis, although they may have some effect in certain cases by direct action upon the ulcer. At times orthoform, given in 10-grain doses, in warm water, is an efficient local anesthetic, when it is able to come in direct contact with an open ulcer.

For the relief of overacid gastric ac-

cumulations, sodium bicarbonate is contraindicated, because its administration results in the production of annoying accumulations of carbon dioxide with resultant gastric retention or painful belching, and because its neutralizing value is comparatively low. Large quantities of bicarbonate of sodium are necessary to give relief, and the administration of it secondarily produces excessive gastric secretion. If alkalies are indicated, better results are obtained by the exhibition of frequent small doses of milk of magnesia or calcined magnesia. The ordinary case is very comfortable when from five to ten grains of calcined magnesia are given every two or three hours. Many cases require no exhibition of alkali, if the physiological principles above outlined form the basis of the treatment. In very extreme cases it is necessary to employ gastric lavage. When it is employed warm Carlsbad water (1 drachm of artificial Carlsbad salts to 1 quart of water) may be satisfactorily administered. Usually the exhibition of atropine or belladonna for the relief of gastrospasms exerts a definite effect toward controlling oversecretion of acid gastric juice.

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### Carbon Tetrachloride for the Removal of Parasitic Worms, Especially Hookworms.

HALL, in the *Journal of Agricultural Research* of April 15, 1921, concludes that so far as may be judged from experiments on 30 dogs, carbon tetrachloride in doses of 0.3 m. p. k., administered in capsules, is more effective against hookworms in the dog than any of the drugs commonly used to remove hookworms, even when these are used in such combinations as chloroform and chenopodium. It appears to be a very safe drug, giving rise to no evident symptoms or post-mortem lesions even in doses five times as large as are necessary to give dependable efficacy against hookworms. It is cheap and deserves to be tested in human and veterinary medicine. Because of the possibility of impurities, only a pure and carefully refined carbon tetrachloride should be used. While this drug deserves consideration with especial reference to hookworms, it is also very effective for removing ascarids, being somewhat inferior to chenopodium in this respect, and will remove whipworms, as other anthelmintics will, when it gets into the cecum. It is not of value against tapeworms.

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### Studies on the Dosage of Digitalis in Children.

MCCULLOCH and RUPE, in the *American Journal of the Medical Sciences* for August, 1921, state that their results show that between eight and twenty kilos of body weight, or up to the approximate age of four years, children respond more readily to digitalis than do children above this weight and age. It would seem that older children with normal hearts require a larger amount per unit of body weight than is necessary to produce an effect in adults with heart disease.

There is considerable variation in the amount of digitalis necessary to bring about a response in the hearts of children.

They have noticed vomiting to be one of the early signs of the effect from digitalis administration, often occurring before there were any alterations in the electrocardiogram. Changes in the electrocardiogram were not constantly found in all the cases in which a digitalis effect was obtained. The most common change observed in this group of children was the appearance of a sinus arrhythmia. Alteration in the size and direction of the T wave occurred in a small number of the cases.

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### Pruritus Ani.

In the *Proceedings of the Royal Society of Medicine* for August, 1921, MACLEOD in discussing this subject before the Section of Surgery said that he would confine his remarks to what might be termed nonsurgical cases of pruritus ani—*i. e.*, cases due to medical or dermatological causes,

and not to lesions such as fistulous openings about the anal valve, deep cracks between the sphincters, polypi, tuberculous ulcers, hemorrhoids or tumors in the rectum or pelvis, obstructing the venous circulation.

In his experience one of the most common medical causes of the symptom of pruritus ani was constipation or the incomplete emptying of the sigmoid flexure and rectum from the unnatural position in defecation necessitated by the ordinary water-closet seats. Another common cause was congestion of hemorrhoidal vessels due either to imperfect action of the liver or reflexly produced by and occurring almost immediately after taking some indigestible food, alcohol, especially red wine, and in many cases coffee. He had known it to occur in a marked degree in connection with glycosuria, and he need not refer to that common cause in children and occasionally in adults, namely, threadworms. In such cases no local lesion might be present, however severe the pruritus, unless it were the secondary effects of rubbing, scratching, or the inoculation of pyogenic organisms. Such cases were commoner in males than females, possibly because they were more given to excess in eating and drinking.

In dermatological practice pruritus ani was frequently met with in connection with diseases such as eczema, psoriasis, lichen planus, boils, and, last but not least, ringworm.

In eczematous subjects, patches about the perineum were frequent, and scratching about the anus was extremely liable to produce an eczematous patch. Such lesions were associated with intense itching, cracking of the skin, especially in the gluteal fold, and weeping.

Psoriasis might also be responsible for it. Recently he had seen a man who had been sent to him on account of this symptom, and on examination he had been found to have a well-defined pinkish-red patch around the anus, extending forward to the scrotum, which was intensely itchy, and proved to be psoriasis, as concomitant patches were present on the knees and scalp. These had given rise to no subjective symptom, and were of such a trivial character that they had been missed previously. The psoriasis lesion at the anus, on the other hand, had obtruded itself, as it had been irritated by the moisture about the anal fold and by defecation.

In cases of lichen planus he had in one or two instances noticed lesions about the anus, and in one case these were of a hypertrophic character, and had given rise to intense irritation. But apart from true lichen planus scratching and rubbing the skin for the relief of pruritus and due to some internal cause was liable to produce a shiny thickening of the skin or "lichenification," in which the thickened epidermis, by irritating the nerve endings, itself produced itching. Consequently a vicious circle was created, and the more the rubbing, the greater the thickening and the more intense and prolonged the pruritus.

Ringworm about the anus associated with ringworm about the groins was by no means uncommon, and was usually of an eczematoid character. It occurred around the anus as well-defined moist red patches with a scaly irregular festooned border, beyond which there were small vesico-pustules on a red base or the dried-up remains of them. In such cases the diagnosis was established by a microscopic examination of the fungus, which was usually the *Epidermophyton inguinale*.

The treatment of cases in which the pruritus was due to some skin disease consisted in that appropriate to the dermatitis.

In those cases in which the cause was internal but in which the skin was thickened and the nerves were pressed upon, great benefit could be derived from *x*-rays, and he had found that three half-doses at intervals of a week were sufficient, great care being taken to protect the testicles by the use of a lead glass localizer. Radium was of equal value, and he had obtained good results in a case from short exposures of five to seven minutes on two consecutive

days with a half-strength applicator unscreened. Painting the thickened skin with salicylic acid 6 per cent in 50-per-cent alcohol, or with 95-per-cent carbolic acid, followed by zinc oxide dusting powder, was of benefit, but it was inferior to either the *x*-rays or radium, and the actual cautery which was sometimes recommended for this purpose was too painful.

For the relief of itching without definite thickening, where no local cause could be detected, the action of *x*-rays in paralyzing the nerve endings was probably more effectual than anything else. Apart from the rays, carbolic acid 1 in 20, alone or combined with hyposulphite of soda as in the following formula, seemed to be as good as any local application:

Acid carbolic, 2 parts;
Sodii hyposulphite, 24 parts;
Glycerin, 24 parts;
Water, 50 parts.

Cocaine and morphine were better avoided on account of the danger of establishing a drug habit. Cracks or superficial abrasions could be healed by the *x*-rays or fairly satisfactorily by ionization with a 2-per-cent solution of sulphate of zinc. Another useful treatment consisted in painting the cracks with 5-per-cent argyrol or in the employment of collosol silver suppositories, when the cracks or abrasions were inside the orifice.

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### The Use of Nitrous-oxide-oxygen Analgesia and Anesthesia in Obstetrics.

SELLERS, in the *New Orleans Medical and Surgical Journal* for August, 1921, states that morphine is a great factor in making nitrous oxide and oxygen more efficient. In his maternity work he uses ⅛ grain of morphine and repeats it in four hours without any ill effect, but it must be given during the latter part of the first stage of labor or the first part of the second stage, on account of its effect on the respiratory center of the baby when given just before the baby is born. The reason that nitrous oxide and oxygen has grown in popularity in the last ten years is as follows:

(1) A short second stage ol labor that is practically painless (McKesson claims that it will shorten the second stage in primiparæ on an average of three hours). (2) Complete relaxation of the soft parts, which minimizes the danger of laceration. (3) Absence of restlessness and rigidity in most cases. (4) The absence of exhaustion. (5) The rapid return to normal after analgesia. (6) Better babies. Any unhappy end results are usually the fault of unskilled use.

There are a few salient points that must be followed most rigidly to obtain the best results from nitrous-oxide-oxygen analgesia.

The patient should be assured that when the pain becomes severe it can be relieved; this tends to remove fear and lessen the possibility of hysteria; the fearful, neurotic or hysterical cannot be handled under intermittent analgesia, but a continuous analgesia must be administered.

When first administered give enough nitrous-oxide-oxygen to produce a deep analgesia or a light anesthesia. This will give the patient confidence in its ability to relieve pain. In primiparæ they sometimes feel that the analgesia is not helping them. Let them have one or two pains without the analgesia, and they will be more convinced of its ability to give relief; this will assure their coöperation.

Determine the number of inhalations necessary to relieve pain without producing a light anesthesia and to increase it if necessary.

The patient must start inhalations with the first suggestion of approaching pain, so she will get enough nitrous-oxide-oxygen to relieve the pain instead of breathing during uterine contraction. It usually takes from two to four deep inhalations before the patient gets enough to relieve the pain. It is essential to hold the last breath and utilize the pain. At first the patient may not see why you insist on starting early, but if she waits until the pain starts and she does not get relief it will be self-explanatory. The efficiency of a nitrous-oxide-oxygen is in ratio to the intelligence

of the patient to a certain point. Self-administration gives the child-bearing woman something to distract her attention from herself, and it is entirely safe and without danger of untoward accidents. Sellers has used it for the past year with very satisfactory results. He does not go into the mechanism of the self-administering apparatus. There must be a thorough understanding between the patient and accoucheur so she will do what she is told. He advises her what to do between the pains—that is, whether to bear down or not, depending on the condition of the perineum. We must not forget that we cannot tell much about the progress of labor by the patient's complaint; therefore it necessitates an occasional rectal examination. Some think that it will cause blue babies, but this has not been true in his experience. After a rather prolonged nitrous oxide anesthetic it is wise to let the mother take 15 to 20 inhalations of oxygen before the cord stops pulsating.

Sellers concludes his paper as follows:

1. Nitrous oxide analgesia is an almost ideal anesthetic agent in obstetrics—specific for pain in most cases and shortens duration of labor.

2. Nitrous oxide and oxygen anesthesia is an ideal anesthetic for operative obstetrics—if we have a competent anesthetist to administer it, other than the rare exceptions, as certain heart lesions, etc.

3. Ether is the next best analgesic and anesthetic and a safer anesthetic in an inexperienced hand.

4. Chloroform and "twilight sleep" should not be used.

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**Nausea and Vomiting in Pregnancy.**

HARDING, in the *Lancet* of August 13, 1921, in summarizing his paper on this subject, states that it has been proposed that the primary etiological factor in the nausea and vomiting of pregnancy is lack of glycogen in the maternal liver.

Secondary factors are intestinal intoxication and neurosis. As the condition progresses starvation and possibly dehydration intensify the symptoms to a degree known as pernicious vomiting.

The correct therapy consists in the recognition of the value of the factors and bringing them under proper control by the following means: (*a*) The use of glucose to restore and maintain the glycogen content of the maternal liver; (*b*) the keeping open of the bowels; (*c*) rest and isolation, with a cautious use of sedatives to control the neurosis; (*d*) the use of water to combat any dehydration.

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**An Interpretation of the Seasonal Variation of Rickets.**

HESS and UNGER, in the *American Journal of Diseases of Children* for August, 1921, conclude that milk from pasture-fed cows (summer milk) failed to prevent the development or to decrease the incidence of rickets during the winter.

On the other hand treatment with ultraviolet rays or with sunlight brought about calcification of the bones during the winter, as demonstrated by means of the Roentgen ray. These contrasting results lead to the conclusion that hygienic factors, especially sunlight, and not dietetic factors, play the dominant rôle in the marked seasonal variation of this disorder.

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**Treatment of Acute Proctitis.**

In the *Medical Record* of August 6, 1921, DRUECK states that the treatment of proctitis varies considerably with the exciting cause, and therefore a thorough examination must be made before instituting any treatment. The parts being irritated and inflamed, the examination is very painful, unless an anesthetic, general or local, is administered. In many instances, where for various reasons chloroform should not be given at the time of the examination, the patient may be relieved of most, if not all, of the pain by the application of a 2-per-cent solution of procaine. A general anesthetic has much in its favor,

because, while the patient is thus asleep, the sphincter may be thoroughly dilated, in that way relieving the tenesmus and greatly facilitating subsequent examination or treatment; at the same time any local trouble or cause of the proctitis may be removed, thereby accomplishing two things at one sitting.

The first indication for treatment naturally is to remove the cause. Impacted feces or foreign bodies must be removed carefully so as not to injure the mucous membrane. The anal sphincters should be dilated, to permit easy and free emptying of the rectum. Decomposed, irritating, infectious intestinal contents should be removed by means of a saline cathartic, which should be taken in sufficient doses to produce a watery stool and a free flushing. After the bowel has been thoroughly emptied, it should be irrigated two or three times during the day with physiological salt solution at 110 degrees.

For this irrigation the patient should be placed in the lateral prone position, with the hips elevated; the irrigator-reservoir being held one and one-half or two feet above the body. The irrigator tip should have a large return flow to allow free exit of débris. The solution is allowed to run into the bowel at a slow rate. Douching in this manner washes out a large amount of infectious material, such as secretions, fecal accumulations, and multitudes of microörganisms; it dissolves mucus and pus, flushing them out as shreds; also it contracts the vascular structure, thereby stimulating circulation, relieving the local congestion, and depleting the tissues.

Following the douche, about two drachms of astringent antiseptics or other medicinal mixture is injected and the patient is instructed to retain it; a 1:5000 silver-nitrate solution being the most reliable. If the pain and tenesmus are not relieved, a ½-grain opium suppository may be inserted. These flushings are to be continued as long as there is any discharge of mucus or pus.

Enemas cannot be substituted for the irrigation, as they increase the tenesmus.

If the symptoms continue after the third day under this treatment, it will be found that there are ulcers on the rectal wall, and these must then be treated locally. The patient is placed in the knee-chest position (which secures atmospheric dilatation); then a speculum is introduced and the entire rectum is inspected. Any ulcer present is wiped free of mucus or débris and painted with pure ichthyol or a 5-per-cent silver-nitrate solution.

The diet should be carefully arranged so as to be absorbable and non-irritating and of such a quality as will insure soft or semi-solid evacuations. A largely absorbable dietary is advisable also in order that the bowels may move less frequently, thus diminishing the deleterious peristaltic movements. Milk should be excluded because it gives rise to hard, irritating curds in the feces. Fibrous vegetables, such as cabbage, kraut, celery, and green corn, are also forbidden, for they irritate the bowel. In their stead gruels of oatmeal, rice and barley, egg-albumen, gelatin, meat broths, and the proprietary prepared foods and peptones should be ordered. Water should be drunk freely and a full glass of flaxseed tea at night. This latter acts as a mild laxative, while also soothing the intestine.

To make the flaxseed tea, take five tablespoonfuls of whole, unbruised flaxseed, pour over it a quart of boiling water and boil for ten minutes, strain through muslin while hot, flavor to suit by adding, before cooking, one tablespoonful of pulverized licorice, or one lemon, or ten drops of oil of peppermint or wintergreen, and two tablespoonfuls of sugar, or after cooling add a wineglassful of wine. Make the tea fresh each day.

The patient should be kept in bed until all pus and blood have disappeared from the stools, because when he is up and about the pendent position of the blood-vessels, together with the thinness of their walls, and the associated congestion and inflammation, give rise to venous stasis, which seriously impedes or even prevents regenerative changes.

## Progress in the Science and Practice of Anesthesia.

J. T. GWATHMEY, in the *Journal of the American Medical Association* of August 6, 1921, asks the question, Can we entirely abolish the use of ether with nitrous oxide and oxygen and get the same resultant relaxation? And answers Yes. By utilizing the synergistic action of magnesium sulphate and morphine as a preliminary, we obtain a safer form of anesthesia with equally good relaxation and with less nausea, vomiting, and depression afterward. Ether is thus absolutely eliminated, and increased anesthetic efficiency is obtained.

To the late Samuel J. Meltzer is due the credit of having discovered the anesthetic properties of magnesium sulphate. He erroneously attempted, however, to use this agent alone, as ether or chloroform was first used. Not only does magnesium sulphate with morphine synergize the nitrous oxide and oxygen, but if used with ether it will reduce the amount required by from one-third to one-half, with no decrease in efficiency. Magnesium sulphate has no deleterious effect on any of the tissues or organs of the body, and when used as a synergist it has no toxic effect whatsoever on the respiratory center. It seems to act mechanically with morphine, holding this drug in contact with the tissues longer than it is able to maintain such contact alone; but with ether, and also with nitrous oxide and oxygen, it acts by deepening or increasing the effect rather than by prolonging it. Hence the same amount of morphine may be used with magnesium sulphate as with sterile water. For instance, ⅛ grain of morphine in 1 or 2 cc of a 25-per-cent solution of chemically pure magnesium sulphate is increased in value from 50 to 100 per cent, as compared to the same amount of morphine used in sterile water. One hypodermic of the mixture will relieve pain for from ten to thirty hours, as compared with two to four hours with sterile water. When magnesium sulphate is used with ether, the latter may be cut one-third to one-half in amount. When magnesium sulphate is used with nitrous oxide and oxygen, the oxygen may be considerably increased and the nitrous oxide decreased.

As the results are constant and the technique new, but simple, an outline might be appropriate at this time.

One and a half hours before the operation a hypodermoclysis is aseptically given, of from 200 to 400 cc of a sterile and chemically pure 4-per-cent solution of magnesium sulphate, at a temperature of 110°F., the solution running in by gravity in not less than thirty minutes. No abscesses or sloughs have resulted. One hour and fifteen minutes before the operation, the first hypodermic of ⅛ grain of morphine in plain water or in magnesium sulphate is given. This is repeated at intervals of fifteen or twenty minutes, until three-eighths grain is given to the average adult. If an idiosyncrasy is present it will develop before the time for the third dose.

Quite often one-fourth grain is amply sufficient, especially for women. The room should be darkened and quiet maintained, or the bed screened and a towel placed over the patient's face. When ready, the patient should be lifted as gently and quietly as possible, preferably on the operating table, and wheeled to the operating theater.

When all is ready the mask is applied to the face, and the oxygen started at the same time as the nitrous oxide. Cyanosis should not be tolerated at any time, as the gases are used only to complete the analgesia and to render the patient unconscious. The oxygen may be rapidly increased up to 35 per cent, or even 50 per cent, as the patient will be found to be fully relaxed, and pushing the nitrous oxide will merely add to the danger without increasing the efficiency. A continuous administration is the most satisfactory.

Another factor that increases the safety of all inhalation anesthetics is preliminary medication. When this is employed, anesthesia comes on sooner and with less excitement; and the margin between complete anesthesia and respiratory failure is lengthened, which means that the margin of

safety is increased. Furthermore, Buchanan has proved clinically that, with the open drop ether method, morphine and atropine decrease nausea and vomiting by more than 50 per cent. The same rule undoubtedly applies to the other general inhalation anesthetics. The use of magnesium sulphate with the morphine still further reduces the unpleasant effects, a state of analgesia taking the place of the depression that sometimes follows the use of morphine.

With magnesium sulphate, morphine and nitrous oxide and oxygen, we can maintain a state of general analgesia with relaxation almost indefinitely, without any deleterious effects. For the new era of anticipatory surgery, Gwathmey thinks, this form of anesthesia is a marked advance.

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### One Thousand Cases of General Anesthesia.

In the *Boston Medical and Surgical Journal* of August 4, 1921, BAILEY states that every case coming to an operation under general anesthesia should have a careful urinary examination and test for presence of acidosis, as well as of the heart and lungs, while the preliminary use of morphine and atropine an hour more or less preceding the operation should be made a routine measure unless contraindicated in exceptional cases.

Introduction by the gas-oxygen-ether sequence should be the method of choice, while maintenance, whether by vapor insufflation, open drop, or rebreathing methods, should be on a steady level, with a carefully regulated vapor concentration and under the lightest anesthesia allowable by the character of the operation.

Gas-oxygen used alone, in connection with morphine and scopolamine, one or both, in the hands of an expert, is sufficient for many major and most minor operations, but the apparatus should be fitted or provided with an arrangement for the instant admission of ether vapor when circumstances require a deeper anesthesia.

The disagreeable conditions and unpleasant features which so often follow an operation and the complications which may arise may be largely avoided or at least greatly modified and diminished by the skill exhibited by the anesthetist during the maintenance period of the operation. In other words, a successful outcome is largely, if not at times chiefly, dependent upon the depth of the anesthesia—the lightest allowable by the operation, the evenness of maintenance, and the quality of the concentration of the ether vapor inhaled by the patient, in connection with close and constant attention to the respiration and pulse and to the condition of the eye and lid reflexes.

Occasional deaths on the table, as well as postoperative deaths, nausea and vomiting, shock and delayed convalescence are due in a large number of cases to the ignorance and lack of skill and proper training of the doctors and nurses who so frequently assist or are called upon to give an anesthetic in the absence of the specialist.

Anesthesia and asphyxia are not synonymous terms, as one might infer from observation of the work, methods and results of most of these well-intentioned but, should avoidable accidents or events occur, criminally responsible people. Except in emergencies, the anesthetic should be handled only by the expert in its use, and the experts, or those seeking to qualify as such, should be limited to those only who are in possession of a medical degree and a license for the practice of medicine and surgery from the proper authorities. During an operation the life and welfare of the patient is relatively as much in control of and dependent upon the skill and knowledge of the anesthetist as it is upon that of the operator. The operator and the anesthetist have an equal liability and responsibility morally, if not legally. The patient or the family have the right to and should, therefore, demand that the anesthetist be a specialist corresponding in skill to that of the surgeon into whose hands the patient has been placed, for the saving or preservation of his or her life, future welfare, comfort, and happiness.

**Silver Arsphenamine.**

In the *Archives of Dermatology and Syphilology* for August, 1921, MICHELSON and SIPERSTEIN state that after a careful survey of the literature and as a result of a limited personal use (250 ampoules) they feel that they may safely state that silver arsphenamine is an efficient spirocheticide, which has a pronounced effect on the visible lesions of syphilis. It is not surprising that the effect on the Wassermann reaction is variable. The effect of all of the antisyphilitic remedies is variable in their action on this phenomenon. The personal factor must be considered; and since the same person cannot receive two drugs under precisely the same circumstances (age of infection, etc.), it is impossible to make an accurate comparison. Suffice it to say that the consensus of opinion of the many observers is that in the majority of cases of fresh syphilis a positive reaction becomes negative after the first course of from six to ten injections of silver arsphenamine.

They note that the technique of solution and injection is perplexing to some operators. Because of the brown color of the solution it is impossible to see undissolved particles. They have found that silver arsphenamine, being a heavy salt, immediately sinks when sprinkled on the surface of its solvent. If two beakers are used the fluid may be gently decanted from one to the other, and when no residue is left in the bottom of the first beaker the solution is ready for injection unless one wishes to use a filter. They encountered no difficulty in seeing the blood on aspiration after venipuncture. By using a Luer syringe with a long glass nozzle the red blood can easily be seen passing through the lumen of the nozzle. There is considerable variation in the optimum dosage. An initial dose of from 0.05 to 0.1 gm. for a person of average weight is best—with a routine dose of from 0.2 to 0.25 gm. Many of the physicians, however, used 0.3 gm. with impunity. Solution in from 10 to 20 cc of water appears to be the strength of solution chosen by most of the observers. We are often warned of the necessity of making slow injections, and that the more dilute the solution the less the danger from reaction. Since Kolle advised the mixture of aspirated blood with the solution in order to reduce the toxicity (a fact which he ascertained by animal experimentation), they believe it should be the accepted technique: Dissolve the necessary dose in 10 cc of sterile distilled water, draw into a 20-cc Luer syringe, make venipuncture, aspirate about 10 cc of blood, and reinject the entire solution slowly. They have infiltrated 1 cc of such solution paravenously to note the effect. It was decidedly less painful than a like amount of sodium arsphenamine, and passed off more rapidly.

There is no difficulty in detecting an oxidized product. It is necessary to make up the solution first. The perfect product makes a rather sparkling, clear, dark-brown solution. A spoiled product has a dull, muddy, grayish-brown appearance.

One of the distinct advantages is the absence of the characteristic, and often nauseating, garlic-like or ether-like odor which patients detect when they are receiving the other arsphenamines intravenously. This odor has made it impossible, or at least impracticable, to administer arsphenamine to certain patients. They administered three doses of 0.1 gm. of silver arsphenamine to such a patient. She made no complaint, and said she could detect no odor.

The interval of choice is from four to seven days, and the number of doses in a course varies greatly.

The majority of observers are not in favor of using silver arsphenamine and mercury simultaneously. In their clinic the authors always complete a course of any of the arsphenamine products before beginning a course of mercury. They can see no advantage of the mixed plan of administration, and believe that one has less control of either drug when they are given together. Furthermore, in case of ill effect, it is difficult accurately to lay the blame.

Concerning reactions: There is apparently no reaction due to silver arsphenamine

which is peculiar to that drug and has not been noticed with any of the arsphenamine group, with the possible exception of argyria, which they propose to discuss later.

Angioneurotic symptoms pass off rapidly. Many observers think that this type of disturbance is due to too large an initial dose, a too concentrated solution, or too rapid injection. All of this may be avoided by a diluted small initial dose, slowly injected.

Fever is noted after the first injection in florid syphilis, as with other members of the arsphenamine group.

Cutaneous manifestations, if urticarial, pass off rapidly. If the manifestations are exanthematous, they are a warning of intolerance, and should be a positive indication for cessation of arsphenamine therapy, at least for a long period (three to six months); arsphenamine should be resumed only with the greatest caution. Riecke's case of death is an example—in the writers' opinion—of not heeding a distinct warning by the organism against further arsenic. In their experience with exfoliative dermatitis following any of the arsphenamines they noticed a decided intolerance. One patient who developed a severe dermatitis after three doses of neoarsphenamine (0.6 gm.) at weekly intervals had a decided exanthem from 0.06 gm. given four months later, with complete rest from treatment in the interim.

Syncope, collapse, headache, weakness, nausea and vomiting are the type of reaction which they used to see frequently when they first began using the American-made arsphenamines. They noted this type of reaction almost constantly after using certain control numbers. They were promptly discarded as toxic products. Possibly this type of reaction, when noted after the use of silver arsphenamine, was due to toxic chemical by-products which unavoidably occurred in early manufacture.

# Surgical and Genito-Urinary Therapeutics

### The Treatment of Trachoma.

BENEDICT *(Minnesota Medicine,* July, 1921) observes that in 1919 in the Mayo clinic 49 active cases of trachoma were found in more than 20,000 cases examined. A digest of the literature on trachoma leads to the opinion that undoubted trachoma exists in localities in severe or malignant form, and questionable trachoma or folliculosis exists in other communities where the malignant form is rare or unseen.

The two diseases, trachoma and folliculosis, have a common pathologic basis. They involve the adenoid tissue of the conjunctiva, appearing in the upper or the lower fornix or on the tarsal conjunctiva, and are characterized by various changes in the appearance of the conjunctiva, including the formation of small papillary protuberances, granular follicles, and hypertrophy of the conjunctiva. In many respects the appearances of the conjunctivæ are identical in the two conditions and cannot be differentiated at the first examination. The attempt to make an immediate diagnosis on the appearance of the everted lids is probably largely the cause of the late revival of the controversy with regard to the handling of trachoma. It seems to be well established that trachoma is a chronic contagious disease that eventually causes destruction of the palpebral conjunctiva, which is replaced by cicatricial tissue; that folliculosis is a chronic inflammatory disease that eventually disappears with or without treatment, but does not of itself cause destruction of the conjunctiva nor its replacement by cicatricial tissue. Trachoma is peculiarly a disease of the conjunctiva, while folliculosis is only a part of generalized adenopathy.

Chronic conjunctivitis of an indetermin-

ate character may be trachoma or it may be folliculosis, and it may be both. The symptoms of the two diseases are often the same, the appearances of the lids and conjunctivæ are sometimes identical, yet the course of the diseases varies and the end results are not the same. Folliculosis can be cured —that is, it may be made to disappear without leaving a trace of its former existence— but trachoma cannot be cured in the same sense, for it always leaves scars in the conjunctiva. By careful treatment, however, its course can be ameliorated, the symptoms made tolerable, and the ultimate changes less deforming and less disastrous.

The pannus which accompanies acute and severe trachoma is perhaps the greatest factor in producing blindness through corneal complications as it is the most difficult to control. The presence of pannus is pathognomonic of trachoma, for it is well agreed that folliculosis does not produce pannus. The next factor of importance in the production of blindness is the cicatricial contraction of the conjunctiva, tarsus, and other tissues of the lid which occurs in the third stage of the disease. With these changes apparent there is no question of diagnosis and little disagreement with regard to the proper treatment. The early stage of trachoma most resembles folliculosis. The disease is then limited to the palpebral conjunctiva, the symptoms often are not intolerable and may last for years without causing the person to seek medical assistance. A rather large number of schoolchildren are found to have papillary changes on the conjunctiva that resemble those characteristic of trachoma, but may be only folliculosis. Without further examination for adenopathy, such as pharyngeal adenoids and enlarged tonsils, and without observation of lids under a course of treatment by astringents, one is hardly justified in pronouncing such cases trachoma. When such cases occur in number in regions where trachoma is known to exist they may be classed as suspicious and isolated until further observation reveals the true nature of the disease, but in communities where trachoma is rare the probabilities of finding a large number of schoolchildren with true trachoma are far too slight to justify the radical measures that have been instituted in some instances, or which would be justified in cases of true trachoma. Persons whose diagnosis of trachoma is doubtful should not be operated on if observation of the effects of various methods of local medical treatment is possible.

Trachoma in the first stage should be treated by daily applications of 2-per-cent silver nitrate solution to the affected area, supplemented by simple non-irritating collyria such as boric acid, normal salt solution, or 10 per cent to 20 per cent solution of argyrol. If this treatment is begun early in the course of the disease the second stage with its attendant discomforts can be shortened or aborted.

The silver nitrate solution should be applied to the conjunctiva of the everted lids by a cotton swab or brush. The simple instillation of the solution into the lower fornix with a dropper is ineffectual if not really harmful. The eye may be previously cocained if the patient so desires, but often the cocaine solution causes more disagreeable symptoms than the silver solution. In the application of the silver solution the patient should look down while the physician holds the everted lids firmly to the face, and the swab is made to brush lightly or heavily over the diseased surface, and especial care taken to apply it to the border of the tarsus nearest the fornix by lifting the tarsus with the swab. The lids are held open until a white film is seen to form where the silver is applied, the excess then immediately washed off with boric acid solution or salt solution. The lids should then be replaced and the lower fornix again irrigated thoroughly. The amount of reaction the day following the treatment should be an indication of the efficacy of the treatment. If the treatment has not been too severe the white membrane will have disappeared completely and a soft, red, velvety surface be exposed. If the membrane has not disappeared or the surface tends to

bleed easily the treatment has been too severe and should not be repeated until the membrane has exfoliated and the reaction subsided. It is better to apply the silver solution in the morning, so that during the working hours the tears will irrigate and flush out the cul-de-sac. At night the lid margins and skin of the lid should be covered with a non-irritating ointment, such as White's, or boric acid ointment, to prevent excoriation and fissures. This treatment should be kept up with only slight omissions for from two to three years.

If treatment of the disease is not begun in the first stage, or if for some reason the disease has not been arrested successfully, we are confronted with a more serious problem. Pannus, ulcers of the cornea, and secondary infection are added to the structural and functional changes of the first stage and require strict attention. However, the same treatment should be applied, but the mechanical removal of large granules by expression or scarification may in certain instances be beneficial. Operation should not be radical, except in the most extreme cases. The lightest touch with sandpaper or gauze dipped in 1:500 bichloride solution sufficient to scarify but not destroy the tissue is all that is justified by results. This operation should be considered a hastening step in the treatment of the disease, not a substitute for the medical treatment. Corneal complications are admittedly stubborn in the second stage of trachoma because they tend to recur frequently, but yield to treatment. The application of silver solution to the conjunctiva may be all that is necessary, combating secondary infection and the toxic effect of decomposing granulations. Usually it is better not to apply a dressing to the eye as it interferes with drainage of the secretion. Boric acid powder with iodoform powder in equal parts dusted onto the cornea gives excellent results. It may be applied within a few minutes after the application of the silver solution to the conjunctiva. Cauterization of corneal ulcers is seldom necessary unless active secondary infection has been implanted.

During practically the entire first and second stages trachoma can be treated satisfactorily by the use of silver nitrate solution alone. A 2-per-cent solution can be used as an astringent or as a cauterizing agent by varying the amount applied and the length of time elapsing before the neutralization with sodium chloride or the washing with boric acid solution. When the disease is well under control and the symptoms have disappeared the silver solution may be discontinued profitably for a few weeks or a few months, and a solution of zinc sulphate of from one to two grains to the ounce given for frequent instillation. A satisfactory method to follow is to stop the use of silver and substitute the zinc solution for one month in three. The zinc solution and ointment for the lids can be used by the patient at home with perfect safety.

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### Sterility in the Male.

WALKER *(Lancet,* July 30, 1921) states that the investigation of the male suspected of sterility resolves itself into two parts: a careful overhauling of the genital tract, and an analysis of the seminal fluid. At the preliminary visit an inquiry is made into the past history, special regard being paid to infection, venereal or otherwise, and to the existence or not of any abnormalities or difficulties in the sexual life of the individual.

Although it cannot be claimed that the examination of a condom specimen is an ideal method of investigation it nevertheless furnishes information of great value. In connection with this examination the following points should be borne in mind:

The specimen should be as fresh as possible. Although mobile spermatozoa may occasionally be found ten hours after emission, little reliance can be placed on an examination in which so long an interval has been allowed to elapse. It must also be remembered that the optimum temperature for the conservation of mobility is comparatively low. If active spermatozoa be placed in an incubator at 37° C. move-

ment will, as a rule, have disappeared at the end of two hours. At 27° C. mobility is more likely to be retained.

A period of abstinence from sexual relations of a week's duration must be prescribed previous to the examination.

In the event of the first specimen proving abnormal, at least two subsequent examinations must be made before an adverse report is issued. It not infrequently happens that after failing to find spermatozoa on two occasions an investigator will discover their presence in the third specimen submitted for examination.

The semen to be regarded as satisfactory must contain a plentiful supply of well-formed and mobile spermatozoa, and must reveal no abnormal elements such as pus cells, indicative of an unhealthy condition of the genital tract. In considering the character of the spermatozoa and estimating the fertilizing efficiency of the semen the following points must be noted:

1. The number of spermatozoa seen in an average field.

2. The percentage of spermatozoa perfect, imperfect, or deformed.

3. The percentage of spermatozoa that are mobile, their degree of mobility, and the time during which mobility persists.

Lode has estimated that about 260,000,000 spermatozoa are emitted in one ejaculation. The faintly acid reaction of the vaginal secretion and its abundant flora are not conducive to the long life of the spermatozoa, so that but few reach the cervical canal. It is easy to see, therefore, that a diminution in the number of spermatozoa in the semen lessens the chance of fertility. The number of spermatozoa found in the semen is reduced in extreme youth and in old age. It is, moreover, subject to variation in the same individual according to fluctuation of general health, and in all probability to seasonal changes. Although man has escaped from the rigid œstrual cycle, to which the majority of the lower animals are bound, it seems probable that his freedom is not absolute. When one recalls the enormous increase that takes place during the breeding season in the size of the testes and accessory glands of the sparrow and the hedgehog, it would appear anything but surprising that the sexual activity and fertility of man should also show some tendency to a seasonal fluctuation.

Before any prognosis can be given or any treatment suggested it is essential that an exact diagnosis should be arrived at. For this purpose the genital tract must be carefully overhauled. The situations at which obstructions are usually found are at the lower pole of the epididymis and in the course of the ejaculatory ducts. These obstructions are almost invariably the sequelæ of old inflammatory reactions, and in 60 per cent of cases are due to gonorrhea. Next in importance to gonorrhea as a cause of obstructive sterility comes tuberculosis. Even when one epididymis alone has been attacked azoöspermia is likely to result, owing to involvement of the prostate and vesicles.

Should no signs of obstruction be detected the absence of spermatozoa in the semen probably indicates lack of spermatogenesis. To confirm this the testis may be punctured with a hypodermic needle and a search made for spermatozoa in the fluid drawn off. The operation is a painful one and a fine needle should be employed. If repeated examinations of the testicular fluid fail to reveal the presence of spermatozoa, aspermatogenesis must be diagnosed. This occurs when the tubules have atrophied as the result of a severe orchitis—*e.g.*, mumps. It is also found, as shown by Mott, in association with various mental conditions, in some cases of cryptochism, in advanced malignant disease anywhere in the body, and occasionally in chronic alcoholism Old age, although productive of oligospermia, is not as a rule a cause of aspermatogenesis.

A certain degree of obligospermia is usually associated with necrospermia, as is also the appearance of abnormal types of spermatozoa. Amongst these are large-headed and small-headed forms, spermatozoa without heads, or double-headed monsters. The condition is generally asso-

ciated with inflammation in the genital tract, and pus cells are discovered in the semen. Statements to the effect that spermatozoa become motionless in the presence of pus or blood are erroneous; but as inflammation is often accompanied by an acidity of the secretions pus is inimical to the activity of the spermatozoa. Necrospermia calls for careful examination of the genital tract for signs of prostatitis and vesiculitis. The appearance of an excess of crystals and amyloid bodies in the semen is not uncommon in this condition.

The rôle of the accessory glands, and notably that of the prostate and vesicles, is unknown. G. Walker showed that excision of both prostate and vesicles rendered rats sterile, whereas their breeding power was apparently unaltered by removal of only one of the glands. Ivanoff succeeded, however, in impregnating rodents by means of spermatozoa drawn directly from the testes. But even although the secretion of the prostate and vesicles may not be essential to fertility they are undoubtedly of considerable importance.

Whatever may be their exact function it is certain that the accessory glands have a very considerable bearing on fertility, and that their secretions, as well as adding bulk to the semen, provide a fluid favorable to the survival of the spermatozoa subsequent to emission. For this reason the condition of the prostate and vesicles should be carefully investigated in any potential case of sterility.

As a result of a conscientious examination it is possible to arrive at a much more precise prognosis in the case of the male than is possible with the female; for whereas nature plays the rôle in producing sterility amongst women, disease is the chief factor amongst men.

In a series of 87 childless marriages in which the wife had been declared normal, Wolbarst found the following incidence of trouble amongst the husbands: 57 per cent suffered from azoöspermia, and 35 per cent from oligospermia. It must also be borne in mind that the mere fact that a normal number of healthy spermatozoa have been found in the semen, and that these retain their mobility for several hours after emission, affords no guarantee that the same mobility will be retained when the semen becomes mixed with the female secretions. To determine this specimens must be taken from the cervix or fundus uteri three or four hours after coitus and examined according to the method advocated by Hühner.

The treatment of sterility in the male will depend on the category in which the case has been placed. An azoöspermia due to the occlusion of the ejaculatory ducts is generally associated with a chronic prostatitis for which the appropriate therapeutic measures must be adopted, including, if necessary, catheterization of the ducts through a posterior urethroscope. The latter may be a simple or an extremely difficult, if not impossible, operation, the determining factor being the situation of the openings. If the obstruction is the result of bilateral epididymitis the operation of vasoepididymostomy, devised by Martin and modified by Lespinasse, may be undertaken, provided that the existence of spermatogenesis has been proved by means of direct puncture of the testes. For the condition of oligo- or necrospermia due to vesiculitis a prolonged course of massage and dilatation must be carried out.

When spermatogenesis is defective or lacking, treatment is of less avail. Attention may be paid to the habits, mode of life, and general health of the patient, and a course of orchitic or lymphatic gland extract given in the hope of exerting an influence on the defective action of the testis. Occasionally aspermatogenesis will be found in men who otherwise appear to be perfectly normal.

Although at the present time it may be impossible to find an explanation for such a puzzling condition of affairs, it is not unlikely that the key to the riddle will be provided by an increased knowledge of the relationship of the testes to the endocrine glands.

## Some Essential Points in the Treatment of Infantile Paralysis.

TIBBETTS *(Minnesota Medicine,* Vol. IV, No. 8, 1921) in his summary emphasizes the following now well-accepted principles:

The early use of immune serum both intravenously and intraspinally.

A cast or brace to prevent stretching of paralyzed muscles, to relieve the acute tenderness, and to prevent deformity. The appliance should be worn during the night as well as during the day. Any overstretching is injurious.

Massage to promote muscle nutrition and muscle tone; and to improve the circulation.

Muscle training, both in the convalescent and chronic stages.

Operations should not be performed under two years and resections should not be done before adult life is reached.

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## The Delayed Transfer of Long Pedicle Flaps in Plastic Surgery.

BLAIR *(Surgery, Gynecology and Obstetrics,* September, 1921) states that a somewhat extensive observation in the making and transplanting of cutaneous flaps for the correction of superficial defects has led to the following conclusions:

That about the neck and face of a man in ordinary health, regardless of age, rather long flaps can be made with little danger to their vitality, provided the return circulation is obstructed neither by gravity nor kinking nor torsion of the pedicle, but that in women and children the circulation is not so vigorous and equally long flaps are less likely to survive.

That in any instance the chance of success is increased, or a longer flap can be raised, or the flap can be cut narrower and thinner, with equal chance of success if it is first completely raised and then immediately sutured back into its original bed and the transfer to the new position delayed for a period varying from six days to two weeks.

That if a flap does slough in its original bed, the extent of the area will be considerably less than if it had been immediately transplanted.

That sloughing of an untransplanted flap is apt to be superficial without destruction of the full thickness of the skin, while a slough occurring after transfer is more apt to involve the full thickness of the flap.

That if a flap will not survive, it is a real advantage to have this fact demonstrated before removal of the scar and freshening of the edges of the defect.

That provision for a possible partial loss can usually be made in the original planning of the flap.

That in the transplanted position gravity may be more favorable to venous and lymphatic drainage, but this will not always compensate for other deleterious factors essential to immediate transfer.

That if it becomes evident that the transplanted flap is in danger of sloughing, it is better immediately to place it back in its original bed. By so doing not only will time be saved but a much larger part of the flap.

That when a flap is to be split into two or more narrow flaps, such as to cover the eyelids or lips, or to line the nose, it is safer to delay splitting the flap until the time of transplantation or to an intermediate time, rather than to do it at the time the flap is first raised.

That in a neck flap which includes a section of the clavicle for a pedicle bone graft, the soft tissues will have a firmer attachment to the bone and the bone will be more resistant to infection if the transfer is delayed.

That a blood-clot under a flap that has been sutured back into place may be fatal to the flap. This is avoided by moderate pressure of dressings and use of multiple drains, to be removed in twenty-four hours.

That if there is to be a raw surface left exposed on the pedicle after transplantation of the flap, it will be more resistant to infection after a delayed transfer.

That certain complicated, time-consuming

operations are advantageously divided into two sittings by this procedure.

That occasionally, after suturing the flap back in its original bed, the transplantation will of necessity be long delayed by a low-grade suture infection or an infection in the bed. Any of these occurrences is an incident rather than a calamity, and is to be guarded against by not drawing the sutures tight, by removing them early, by free drainage, and by ordinary cleanliness.

That when any part of the flap sloughs while in its original bed, that part, no matter how superficial the slough, should not be transplanted.

That another disadvantage of the method, more apparent than real, is that it involves two operations in place of one. The author's own experience has been that two properly planned operations usually bring success, while the single operation has too often been followed by immediate failure, necessitating a large number of subsequent steps.

That even delayed transfer has not been successful in every case.

This article is characterized by a large number of admirable illustrations.

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### Surgery of the Prostate.

HUNT *(Minnesota Medicine,* September, 1921) observes that of all patients seen in the Mayo clinic for a period of eight and one-half years in whom symptoms were produced by prostatic lesions, only 42 per cent were surgical.

Prostatitis is of two distinct types. The acute form, practically always due to gonorrheal infection, occurs most often in young men, and because it usually responds to non-surgical treatment is very seldom treated surgically. Chronic prostatitis may be the result of gonorrheal infection in youth, but may give rise to few symptoms until later in life. In a recent review of 856 cases in which prostatectomy was performed, the gland was of the chronic fibrous type in fifty, without adenomatous hypertrophy; in forty-eight, prostatitis was the primary condition, and the glands contained a few small adenomas; while in fifty-six marked prostatitis was associated with primary adenomatous hypertrophy. Chronic prostatitis, with little enlargement of the gland, is capable of producing all the symptoms of adenomatous hypertrophy; that is, frequency, difficulty, and incomplete emptying of the bladder, with the residual urine at times amounting to the entire capacity of the bladder, and in some cases acute retention. The marked fibrosis in this type of protatitis and the absence of cleavage planes correspond to those changes occurring in other parts of the body following infection, which would indicate that infection must play an important part in the etiology of urinary disturbances in the presence of this type of gland.

Prostatic abscesses, single or multiple, quite often occur secondary to the acute infections of the prostate during the course of venereal disease. Few, however, become surgical, for they usually point and drain through the urethra. As a surgical condition, therefore, prostatic abscesses are of relatively slight importance.

Carcinoma of the prostate is found in 15 per cent of the patients with symptoms of prostatic obstruction. Unfortunately, the onset of these symptoms is insidious, and, as is seen in malignancy elsewhere in the body, the symptoms are usually manifest only after the disease has advanced locally to the paraprostatic tissues and the bladder, and remotely by metastasis. Surgery has seldom been productive of permanent good results in these cases. Bumpus, in an analysis of 362 cases of carcinoma of the prostate observed in the Mayo clinic, found that remote metastasis had occurred in 21.8 per cent. This finding led to a more careful examination and search for metastasis in a later series, and metastasis to the bones was revealed in 30.3 per cent of 135 patients who were subjected to Roentgen examination. The bones most frequently involved were those of the pelvis, and spine, and the femur. Metastasis to the lungs occurred rarely and late in the disease; it was found

in the regional glands in 10.2 per cent of 362 cases.

Metastasis found at the first examination immediately removes from the surgical field approximately 40 per cent of all cancers of the prostate.

Benign adenomatous hypertrophy is by far the most frequent surgical lesion of the prostate. It occurs most often late in life. Only 5 per cent of a series of 856 patients were under fifty. Twenty-eight per cent were between the ages of sixty and sixty-five, and 83 per cent were in the sixth and seventh decades.

It has been pointed out that the size of the gland bears no relation to the amount of disturbance it may produce. In 9.7 per cent enlargement of the gland was graded 1 (on a scale of 1 to 4); in 48.45 per cent it graded 2; in 33.95 per cent it was graded 3; and in 7.8 per cent it was graded 4. A slightly enlarged gland may produce marked obstruction with the residual urine amounting to the full capacity of the bladder, while a huge intraurethral and intravesical gland may not produce mechanical interference with complete emptying of the bladder at urination, or any of the other manifestations of prostatic disease, and may be spoken of as the "silent" prostate.

The indications for or against operation in benign hypertrophy of the prostate are based on the amount of disturbance the gland is producing and the general condition of the patient. A large prostate, found in the routine examination, if unproductive of frequency, difficulty, pain, hematuria, or incomplete emptying of the bladder with resultant residual urine, is of itself usually not surgical.

The anatomic location of the prostate gland offers two methods of approach for surgical removal, the perineal and the suprapubic transvesical routes. Each method has its advocates, and some surgeons employ the combined perineal and suprapubic approach. The perineal method possesses the disadvantages of possible operative injury to structures, resulting in the frequent postoperative complications of incontinence through injury to the external vesical sphincter, and of rectourethral fistula through accidental opening of the rectum during the operation. The adoption of the suprapubic route by surgeons who have had experience with the perineal operation seems to indicate that these complications outweigh the advantages of the operation. The suprapubic route approaches immediately the part of the gland, that is the median and lateral lobes, in which adenomatous hypertrophy occurs, and affords an opportunity thoroughly to explore the bladder, and to treat frequently associated lesions such as calculi and diverticula, and, rarely, carcinoma of the bladder.

Some surgeons employ the two-stage suprapubic operation in all cases, and others employ the one-stage operation entirely. An intermediate course is taken at the Mayo clinic; the one-stage operation is preferred after preliminary preparation by urethral drainage of the bladder. The percentage of cases in which the one-stage operation may be performed with safety has been increased by the use of Van Zwalenburg's method of decompression. In the past the foremost argument in favor of the two-stage suprapubic operation has been the elimination of infection. However, the foul, sloughing wounds and infection in the prevesical space following the one-stage operation have practically disappeared and are now rarely seen. This absence of infection may be accounted for by the fact that formerly prostatectomy was performed with little or no preparation of the urinary tract by urethral drainage and irrigation of the bladder, and the operation was conducted in the presence of serious infection.

The recognition in recent years, preoperatively or at operation, of diverticula of the bladder has eliminated a postoperative source of infection. The improved technical accuracy of the one-stage operation has been productive of better wounds, less infection, and a shorter convalescence. The two-stage operation necessitates the blind enucleation of the gland, and through the lack of facility to perform the operation accurately

under the eye, to control bleeding, and so forth, directly opposes the general principles of surgery, with little or nothing to be gained by the patients through its use. The operation has been acclaimed ideal for the patient who is a poor risk, in that it is a divided procedure, is less time-consuming, and requires a short anesthetic. These reasons do not seem to apply at the present time. The progress made in surgery has improved the technical details of the operation of prostatectomy, and has presented us with anesthetics other than ether which excludes the time element as an important factor.

The combined transsacral and abdominal infiltration with novocaine affords an ideal anesthesia. For the past six months all operations for removal of the prostate gland have been performed by the use of one or the other of these anesthetics. They eliminate the time element from the operation and allow wide-open exposure of the bladder, affording thorough exploration and visual removal of the gland, with accurate control of the bleeding. To the patient who is a poor risk exposure and accuracy of operation are exceedingly important, for he is intolerant to postoperative bleeding.

Important details in the one-stage operation are: Careful suturing of the bladder neck, which is the source of most of the bleeding; control of the bleeding from the interior of the prostatic capsule; and accurate closure of the bladder. Various methods have been devised to control the bleeding from the interior of the prostatic capsule. The Pilcher bag is being used successfully in the clinic for this purpose; by its use all of the suprapubic tubes may be removed from the bladder the day following operation, and a urethral catheter inserted, which in the majority of cases allows the wound to heal by first intention, with no urinary drainage suprapubically after the removal of the bag. The convalescence is materially shortened in these cases.

The mortality rate in the operation of prostatectomy has been greatly reduced during the past few years. This has been due to the recognition that these patients are potentially uremic, and that treatment of the actual or potential uremia is necessary before operation; the increased technical accuracy of the operation, and the elimination of ether as the anesthetic. Greater care in the selection of cases, more accurate determination of when the patient is ready for operation, and the use of anesthetics that do not depress the kidneys, should reduce the mortality rate to approximately one per cent. Suprapubic prostatectomy is productive of excellent functional results and is devoid of any of the complications of the perineal operation. The results of operation have recently been determined by questionnaires sent to 614 patients. Ninety-four and five-tenths per cent report that they are cured or markedly improved.

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### The Treatment of Imperfectly Descended Testicle.

PANNETT *(Lancet,* August 20, 1921) thus concludes a paper on this subject: He applies the term orchidocelioplasty to placing the testicle in the abdomen intra- or extra-peritoneally.

The future treatment of the incompletely descended testicle will lie in the direction of furnishing the missing stimulus to full development.

The ectopic testicle can usually be transferred to the scrotum without endangering its future growth.

It is not possible to implant a testicle arrested in the inguinal canal into the scrotum without damage to the organ.

The replacement of such a testis into the abdomen will destroy any prospect of ultimate spermatogenesis, while it will not interfere with the internal secretory function. The seminal tubules are unable apparently to secrete against the high resistance imposed by the passage through the coni vasculosi and epididymis, unless they are aided by the contractions of the cremaster muscle.

Early operation is not recommended. An uncomplicated bubonocele is no indication

for operation, but attacks of torsion or strangulation are.

When it is impossible to bring down the testicle into the scrotum without endangering its blood supply, orchidocelioplasty is preferable to removal. The technique of the operation is indicated.

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### Enlarged Thymus in Infants.

BLACKFAN and LITTLE (*Archives of Pediatrics,* July, 1921) presented this study, which was illustrated with lantern slides. It consisted of a clinical and roentgenological examination of the thymus both in normal infants and in those who had presented symptoms referable to it. In a few instances the findings were confirmed at autopsy. An extensive series of radiograms, taken before and after *x*-ray treatment, had been analyzed with reference to the diagnosis of enlarged thymus. The results indicated that an area of dulness in the region of the thymus, with a corresponding shadow in the roentgenogram, occurred in a relatively large number of normal infants. That this was due to the thymus was shown by the fact that the shadow became smaller after exposure to the *x*-rays. A thymus large enough to be demonstrated by percussion and to show on the plate did not necessarily cause symptoms. The observations of previous workers, that an enlargement of the thymus could be demonstrated by percussion and by roentgenograms, were confirmed.

Friedlander called attention to the fact that the *x*-ray gave no idea of the anteroposterior dimensions of the thymus. One might have a large flat thymus that gave no symptoms though it gave a large shadow, whereas a thymus might be thick anteroposteriorly and produce symptoms and yet give a small shadow. The mere fact of a large upper mediastinal shadow associated with enlargement of the thymus did not necessarily mean that symptoms were produced. It might be that as many as 46 per cent of children would be found to show an enlargement of the thymus, and a large percentage of these showed no symptoms. If symptoms of thymic asthma were present, even though the *x*-ray showed no shadow, radiation should still be given. In a study of 300 cases they had found it worth while to employ radiation.

Freeman, of New York, said he thought that thymic asthma was sometimes taken to be simply convulsions such as occurred with slight infections. In some of these cases the convulsions ceased after treatment with the *x*-ray. Dr. Freeman cited a case of thymic asthma in which the symptoms were relieved by *x*-ray treatment though the shadow on the *x*-ray plate was apparently larger than before the treatment. He had had two other cases treated without reduction in the size of the thymus. Dr. Gerstenberger's sign was very valuable. If one was dealing with a tumor in the upper mediastinum that got larger and smaller with inspiration and expiration, he might be pretty sure it was the thymus and nothing else.

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### Results of Institutional Treatment in Surgical Tuberculosis.

TELFORD (*British Medical Journal,* July 2, 1921) observes that the figures given in this article as the result of follow on in these cases refer solely to the child crippled by tuberculosis, and embody the results obtained by work done at the Manchester Residential Schools for Crippled Children over the period 1905-18. These schools are maintained by the Manchester Education Committee, and occupying two large houses on the north side of the town, they provide patient accommodation for 114 cripples, of whom some 50 to 60 are cases of surgical tuberculosis of the spine and lower limb.

The fact that the schools are managed by an Education Committee involves two important consequences. The children admitted must be between the ages of five and sixteen years, and it is further a *sine qua non* that they be in a sufficiently good state of health to be able to take the ordinary school lessons. The age limit is unfortunate, since very many cases of surgical tuberculosis begin before the age of five;

in a large series of cases in which the author endeavored to determine the actual date of onset the average worked out at exactly three and a half years of age. Hence it is to be feared that we miss not a few early cases. The second consequence is, that as the institution is primarily a school the type of case admitted is limited to early non-complicated cases and to chronic cases which have not suffered materially in general health.

The treatment of the cases has been on strictly "conservative" lines, with very careful and exact fixation. Abscesses have been treated by aspiration, and very little open operative work has been done. As the number of beds is so much below the needs of the situation, the cases admitted have been entirely those needing recumbent treatment, and therefore the results given in this paper are of necessity restricted to cases of tuberculous disease of the spine and lower extremity.

The schools having been in existence for sixteen years are in a position to yield exact information on the result of treatment.

A very careful investigation has been made into the after-history of 159 cases which have been traced and examined; to minimize error no recently discharged case has been included. All the children dealt with in this report were discharged from the schools not less than three years ago.

Out of 100 children between the ages of five and sixteen years, treated under good conditions for tuberculous disease of the spine and lower extremities, 68 will be cured and able to attend an ordinary school or follow a useful employment; 10 will receive no permanent benefit; and 22 will die from the disease or its sequelæ.

The very grave nature of tuberculous disease of the spine is well shown by the figures; of 70 patients with it no fewer than 26 are dead. The mortality is much less for disease of the hip—9 out of 52. The knee shows only 2 out of 31. The six cases of disease of the ankle and feet recovered completely.

The development of abscess is always of grave omen, and it is interesting to note that of the 35 cases which died no fewer than 29 showed evidence of abscess formation on admission to the schools.

A point of real importance is the length of time needed for the treatment of these cases, since this length of time bears directly on the cost and number of beds required in any suggested scheme. The average time is certainly longer than is commonly supposed or usually indicated in the text-books. The author finds that in his own cases of surgical tuberculosis of the spine and lower extremity the average duration of in-patient treatment is three years and two months.

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### Chronic Vesiculitis.

WOLBARST (*Medical Life,* August, 1921) notes that the treatment of seminal vesiculitis has undergone a radical change within the past few years. Merely stripping or massaging the vesicle will rarely bring about a cure, because the sacs are not emptied of their accumulated secretions by this procedure, even if they can be reached by the finger.

To-day the proper treatment of chronic vesiculitis has become a purely surgical procedure. The day of santal oil and Lafayette mixture for "chronic gonorrhea" has passed. Urologists may differ as to the best means of attacking these infected sacs, but all agree that the treatment has but one object in view, namely, to get rid of the toxic purulent products which fill them. To this end various surgical procedures have been devised, each method having distinct merit in certain types of cases.

Belfield brought the subject within the realm of practical surgery by his operation of vasotomy, by means of which he injected medication into the infected vesicles via the vasa deferentia. This was followed by vesiculotomy (drainage) and vesiculectomy (excision), both of which procedures have been perfected recently.

Undoubtedly there are cases that require nothing less than drainage or absolute excision, but it probably is the consensus of

opinion to-day that these cases are the exception and not the rule. In the hands of many urologists vasotomy and its modifications have given most satisfactory results. In the author's experience, covering approximately one hundred cases, this operation has proved of inestimable value, and he is convinced it is the ideal method of treatment for the average case. The most striking results have been observed in cases belonging to the "neurasthenic" and arthritic groups. In unusually severe cases, in which vasotomy has failed, drainage or excision through the perineal route is indicated.

Vasotomy can be performed as an office procedure, but it is best done in a hospital or in the patient's home, where he can rest in bed for a day or two. Moving about immediately after the operation is apt to be followed by epididymo-orchitis.

A brief description of the operation may not be amiss: Each day for several days before operation the prostate and vesicles are vigorously massaged and the bladder irrigated, in order to empty the vesicles as much as possible. Under local anesthesia the vas deferens is exposed through a short incision in the scrotum, near the external ring. After carefully stripping its many fine coverings a solution of one of the silver salts is injected into the vas by means of a syringe and a blunt-pointed needle of fine caliber. Usually 5 cc of argyrol, collargol or protargol solution are injected. Collargol seems to produce less irritation in the lumen of the vas. Unless there is an obstruction in the vas or the ejaculatory ducts, the solution thus injected can be recovered almost immediately through a catheter inserted in the bladder, thus demonstrating that the fluid has passed through the vesicles and the ejaculatory ducts into the posterior urethra and bladder. The vas is then dropped back into the scrotal sac, the skin and fascia closed with a chromic suture, and a dry dressing applied, held in place by a suitable suspensory bandage. The entire procedure, if properly performed, is absolutely painless. The anesthetic used is a ½-per-cent solution of novocaine used freely.

For several days, sometimes for some weeks, the urine voided by the patient will be stained black or brown by the retained argyrol or collargol solution; in some instances a seminal emission ten or twelve days after the operation likewise will be brown or black in color.

After the operation it will be found advantageous to administer vaccines in order to combat the general toxemia which is usually associated with chronic vesiculitis. A faithful adherence to this method of therapy generally will bring about the desired results in the vast majority of cases.

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### The Hybrids and Secondary Infections in Lupus Vulgaris, and the Therapeutic Consequences.

Brocq *(Urologic and Cutaneous Review,* September, 1921) summarizes an excellent and well-illustrated article on this subject as follows:

If in the presence of lupus vulgaris there is great infiltration, giving to the touch and particularly to scarification a sensation of hardness and resistance, rebellious to local treatment, a hybridization of syphilis and lupus must be considered, and an antisyphilitic test treatment consisting of injections of calomel or of arsenobenzol or novarsenobenzol should be administered.

Erysipelas which supervenes in a patient suffering with lupus vulgaris does not always exert a benign action upon the evolution of lupus.

Staphylococci and streptococci can infect the surface of lupus, and exercise an injurious influence upon the course of this affection. From this point of view we must distinguish three objective forms of complications.

The first form, impetiginous, is characterized by pustules, more or less voluminous, by yellowish or blackish crusts, and by a relatively rapid extension of the lesion. The forms of careful local dressings recom-

mended are such as those employed for dermatitis, and in rebellious cases the injections of polyvalent antistaphylococcus and antistreptococcus vaccines.

The second form, papular, is characterized by the production over the surface of the diseased area of a sort of fleshy papules, closely packed together and secreting a thick serous fluid which dries into crusts. The appearance of the lesion is frambesiform. This form seems to be quickly modified by intravenous injections of novarsenobenzol, by quadrilateral linear scarification, and dressings of potassium permanganate.

The third form, bacterial phagedena, is characterized by an infiltrated border, bright-red, bathed in pus, sharply arranged in a geometric form cut sharply on the inside, and by a rapid extension. It is essentially "vorax." This form responds to the treatment of the phagedenic ulcer with hot air, applications of methylene blue, dressings of iodoform, etc. It seems that the combination of this medication with linear quadrilateral scarification and injections of arsenobenzol is helpful.

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### Heliotherapy.

AHLSWEDE *(Urologic and Cutaneous Review,* September, 1921) gives a review of this subject in which it is pointed out that Reyn, Ernest, Rollier and Vulpius were the first to demonstrate the powerful healing influence of the sun on tuberculosis and lupus vulgaris. The lack of sufficient sunlight in northern Europe then led to the search for adequate substitutes. These were found chiefly in the shape of the Finsen lamp and the mercury vapor lamps. Of these, according to Axel Hensen and Johansen, the Finsen light approaches nearest to sunlight in its effect. It contains the same proportion of short-waved rays and long-waved penetrating rays provided the filament in the arc light is exactly composed. The mercury vapor lamps on the other hand differ from the light of the sun inasmuch as they show a line spectrum compared with the continuous uninterrupted spectrum of the sunlight. Furthermore, they contain larger groups of violet and ultraviolet rays as well as a larger proportion of short-waved and less penetrating rays than are found in sunlight and the Finsen light.

The ultraviolet spectrum of the vapor lamp even contains such short-waved rays (from 292.5 to 184.6 r.) as do not exist either in sunlight or the Finsen light. Thus we arrive at the conclusion that the mercury vapor lamp, which is most commonly used for substituting sunlight, shows a spectrum which is actually very different from that of the sun.

The biological and therapeutic effect of rays on the skin depends on their wave length. The shorter the wave length the shorter the effect on the surface of the skin. The superficial layer of the epidermis absorbs the short-waved rays—at the site of absorption a strong superficial influence is seen. The long-waved rays on the other hand are more penetrating. They go deeper into the subcutis and body. It was therefore necessary to cut off the mercury vapor spectrum at a certain wave length to get as near as possible to the spectrum of the sun. It is advisable to use mercury vapor lamps at one yard distance, as short-waved rays are mostly absorbed by the air beyond this distance. In cases, however, in which a stimulating effect is desired (treatment of wounds) the short-waved rays may prove useful.

The effect of light on an unprotected skin shows the following visible degrees of intensity:

Erythema due to heat.

Inflammation due to light.

Pigmentation.

The erythema is seen immediately after exposure of skin. It shows a hyperemia which rarely lasts more than one hour and then disappears. Mercury vapor lamps do not cause this reaction as heat rays are not contained in their spectrum.

The inflammation of the skin by light is generally seen in from five to ten hours after the exposure. The degree of the in-

flamation depends on the length of exposure and the intensity of the light.

As to the pigmentation, this is generally seen two to five days after the exposure to light. It is a defensive action of the system against the light. The erythema gradually turns darker, almost brown. The skin begins to peel off. The skin gets used to the light; its sensibility decreases to a degree which renders an inflammation of the skin even after long exposure to intense rays impossible. This, however, can be said only with regard to the Finsen light and sunlight. Mercury vapor rays always cause erythema; the skin cannot become immune to their influence.

Light has its effect in the body, not only on its surface. Hansen's experiments showed that the Finsen light effected an increase of hemoglobin and the red blood corpuscles. Hertel showed that under the influence of light hemoglobin passes its oxygen on to the tissues more quickly. The bactericidal effect of light has also been proved. Strong influence of the ultraviolet rays on the spleen of mice was seen, followed by an increase of giant cells, etc. The possibility of influencing internal organs has thus been proved.

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### The Surgical Treatment of Certain Types of Dyspepsia.

McGuire *(Southern Medicine and Surgery,* August, 1921) observes that a generation ago the physician held undisputed sway in the treatment of digestive disturbances, and the suggestion that dyspepsia could be cured by surgery, when medical, dietetic, and hygienic measures had failed, would have been regarded as an absurdity. It is now accepted that indigestion when chronic or recurrent is almost invariably caused by organic changes in the stomach, duodenum, gall-bladder, or appendix, and that relief from symptoms in such cases can only be permanently secured by the surgical correction of the anatomical lesion.

Every one suffers at times from indigestion due to imprudence in eating, but no one has constant persistent dyspepsia lasting for months or years unless it be due to some organic disease. A case of indigestion ought not to be subjected to surgery until it has been carefully and properly treated by medical measures without success, but every case that fails to secure relief in a reasonable time should be examined to see if there is not some indication for operative intervention.

In investigating a patient it should be remembered that while the symptoms may be due to disease of the stomach itself, they may also be due to reflex irritation from disease of some other abdominal organ. It is a fact that in nine out of ten cases the lesion is not in the stomach but in some associated viscus such as the duodenum, gall-bladder, or appendix. In other words, while the symptoms are gastric and the treatment surgical, the operation required is not necessarily on the stomach.

At one time it was thought that the operation of gastroenterostomy was a panacea for all gastric disorders. It was found, however, that while in some cases it accomplished brilliant cures, in others it not only did not relieve but actually increased the patient's distress.

A gastroenterostomy will cure the symptoms due to an organic obstruction of the pylorus because it relieves the condition by affording a new exit for the stomach contents. It will not cure but will aggravate the symptoms due to spasmodic obstruction because it overcomes the protective effort on the part of nature to prevent the passage of irritating gastric contents into the intestinal tract.

The most common operations for the relief of dyspepsia due to organic diseases of the stomach are partial gastrectomy, pyloroplasty, and gastroenterostomy.

Partial gastrectomy is the operation done for ulcer or carcinoma of the pyloric end of the stomach. It originated as a pylorectomy with anastomosis of the cut end of the duodenum into the upper angle of the gastric incision; it was then changed by

Billroth to complete closure of the stomach with a posterior gastrojejunostomy; and finally it has been perfected by Mayo, who recently introduced the method known as the modified anterior Polya operation. This operation can be done with low mortality on suitable cases, and gives admirable results. Patients with ulcer of the pyloric end of the stomach are relieved of all symptoms and restored to complete health. Patients with cancer of the stomach have their life prolonged, and in the 306 cases reported by the Mayo clinic, over 37 per cent of the patients have remained well at the end of a three-year period. This is a most satisfactory showing for the surgical relief of an otherwise hopeless condition, and even better results may be expected when cases are diagnosed earlier and referred to the surgeon more promptly.

Pyloroplasty is the operation done on the pylorus for the excision of an ulcer or the relief of obstruction due to non-malignant disease. The operation at first consisted of an incision through the wall of the pylorus in a line parallel with its long axis and the closure of the incision at right angles to the direction in which it was originally made, thus widening the pyloric opening and relieving the narrowing. This operation has been modified by Finney, Horsley and others so as to make it more effective and applicable to a larger number of cases. Pyloroplasty is an ideal operation both from an anatomical and physiological standpoint, but it is also ideal in the sense it can rarely be satisfactorily performed.

Gastroenterostomy is the operation most frequently done for benign obstruction of the pylorus and for duodenal ulcers. It consists of an anastomosis between the stomach and a loop of the jejunum, thus establishing a new opening through which the contents of the stomach can reach the intestinal tract. The effect of the operation on the stomach is both mechanical and chemical. Mechanically it permits the gastric contents to pass readily into the intestines, as the new opening between the stomach and jejunum relieves any obstruction that may have existed at the pylorus. Chemically it lowers the acidity of the gastric contents, as the new opening also permits the alkaline secretions of the liver and pancreas to pass into the stomach.

How a simple gastroenterostomy cures a duodenal ulcer is a theoretical question. It is a practical fact that it does cure. While gastric ulcers freqeuently lead to cancer, duodenal ulcers do not undergo malignant changes. There is therefore no reason to excise them unless they are causing hemorrhage.

If this be the case and the ulcer is accessible, it may be wise to destroy it with a cautery. Balfour noted the fact that a peptic ulcer which perforated always healed if the patient lived. An analogous condition can be created by burning through the bowel over the center of an ulcer with a pointed cautery and then suturing the opening and protecting the wound with a tag of mesentery or omentum.

While the operation of gastroenterostomy requires explanation and apology, still in properly selected cases it gives good results and will continue to be frequently employed by the best surgeons the world over until some better method is devised. The operation has been much abused.

The most frequent operations for the relief of dyspepsia not due to organic diseases of the stomach are those done for appendicitis, cholecystitis, duodénal ulcer, or other diseases which interfere with digestion by causing a spasm of the pylorus. Pylorospasm is not a disease but a symptom.

The unsatisfactory results which sometimes follow operations for the cure of dyspepsia may be classed under four heads:

1. Failure of the diagnostician to recognize the true cause of the symptoms.

2. Failure of the operator to apply the proper technique to meet the indications.

3. Failure of surgery up to the present time to develop a satisfactory operation to correct certain conditions.

4. Failure of the physician to properly direct and supervise the patient's post-hospital treatment.

# Reviews

A Text-book of Embryology. By Frederick Randolph Bailey, A.M., M.D., and Adam Marion Miller, A.M. Fourth edition, with 663 pages and 503 illustrations. New York, William Wood & Company, 1921.

This edition without material alteration represents the subject brought up to date. While this volume may not meet the requirements of a detailed laboratory course in each individual medical school, nevertheless it offers the student so good a general exposition of the subject as to be readily acceptable as a text-book. The descriptions are clear and concise and the illustrations for the most part explanatory of the text.

The rearrangement whereby the early developmental stages of the representation of each major vertebrate phylum are described consecutively in the same chapter is a distinct advantage. The continuity of ideas that is essential to a ready comprehension of these important early stages is unbroken.

The chapter on the Fetal Membranes should have been left in its original place, as it logically follows the subject of the germ layers in sequential consideration of embryonic subjects.

An illustration representing the development of the inferior vena cava in the cat supplemental to description on pages 227-81 would be advantageous.

The Life of Jacob Henle. By Victor Robinson, M.D. Medical Life Company, New York, 1921. Price $3.

Dr. Robinson, who is already well known to the medical profession for his entertaining dissertations upon various subjects, some of which have an historical importance, now gives us a small volume of a little over 100 pages devoted to the life of one of the noteworthy characters in the advance of medical science. The text opens with a description of the circumstances under which Henle was born, deals to some extent with other members of his family and with his early youth, and then proceeds to discuss his life as a medical student at the University of Bonn, where poverty proved to him the stimulus it has proved to many another great man in his early days. Later his life in Berlin is discussed, then his sojourn in Zurich, and Chapter V deals with a very human aspect of the man, in his love affairs. The book also contains pictures of the notable characters that Henle came in contact with at the various seats of learning which he frequented, and towards the close deals with his jubilee. The ninth chapter of the book discusses comparatively briefly Henle's notable contributions to science.

Ephraim McDowell: Father of Ovariotomy and Founder of Abdominal Surgery. By August Schachner, M.D., Illustrated. J. B. Lippincott Company, Philadelphia, 1921. Price $5.

This very beautiful biography of a celebrated American surgeon has been prepared by one who writes with all the enthusiasm of a warm admirer, and he has taken the pains to seek out all the historical facts that are obtainable in regard to a very remarkable man in early American medicine.

The author first deals, very naturally, with the ancestry of Dr. McDowell, with his studies as a pupil in Edinburgh, with his leaving Edinburgh without his degree, and then *in extenso* with the memorable case of Mrs. Jane Todd Crawford, upon whom he did his successful operation, with a description of the attacks made upon him for being bold enough to do something which had never been done before. In the subsequent chapters he deals in addition with criticisms of him made by physicians who at that time were considered leaders in

their profession, and with a report of his unpublished cases.

In Chapter VII there is a discussion of the tradition that his operations were performed upon negro slaves, a review of the attempts to deprive him of his honors, and this chapter is followed by others in which the attitude of English and French physicians toward McDowell's work is discussed.

In Chapter XI we find portraits of McDowell and of the monument erected to his memory, with an account of the centennial celebration of the first ovariotomy, and a review of the efforts made to purchase the house in which McDowell lived.

The last chapter of the book is devoted to the heroine of the first ovariotomy, Mrs. Crawford, with an illustration of her gravestone, which indicates the long period of life which she enjoyed as the result of her bravery and Dr. McDowell's boldness. The book is printed in large type, heavily leaded, on excellent paper, and represents the best type of book-making on the part of a well-known firm of publishers.

DISEASES OF THE DIGESTIVE ORGANS. With Special Reference to Their Diagnosis and Treatment. By Charles D. Aaron, Sc.D., M.D. Third edition, revised; illustrated. Lea & Febiger, Philadelphia, 1921. Price $10.

Dr. Aaron has been sufficiently fortunate and clever to have provided such useful text, upon a subject to which he has devoted himself, as to result in a third edition of his book being called for within a comparatively short time after the first edition made its appearance. Gastroenterology is one of the departments of medicine which during the last decade has made very notable advances.

The author has taken pains in his text as far as possible to bear in mind the fact that there is an intimate relationship between gastroenterology and other branches of internal medicine, a point which those who devote themselves to specialties are prone to ignore. The physiology of digestion has been considered from the viewpoint of the physician rather than that of the physiologist, but at the same time the advances made in the physiology of the digestive apparatus have received due consideration. New tests of the gastric contents are described and their value expressed, and the employment of the duodenal tube, which is becoming more and more used, is fully dealt with, the different types being adequately described. So, too, the use of the *x*-ray as an aid to gastroenterological diagnosis has been adequately considered, as has also dietetics.

The author well points out that the general profession employs hydrotherapeutic measures too little and has not sufficient knowledge in regard to the various mineral springs in the United States which might be used with advantage.

Attention is also given to the subject of kinks, adhesions, membranes and tumors, and the parasitic invasion of the intestines, as well as diseases of the rectum and anus.

Altogether the book may be considered a very satisfactory summarization of the subject of which it treats. It is excellently printed in clear type, on good paper, and the illustrations are adequate and complete. There is a special chapter upon medication in gastric diseases, which doubtless will prove interesting to some of our readers. We see little use in the author burdening his text with the pharmaceutical description of the drugs that he discusses, but this is a matter of very minor importance.

VICE AND HEALTH: Its Problems and Solutions. By John Clarence Funk, M.A., LL.D. The J. B. Lippincott Company, Philadelphia, 1921. Price $1.50.

This book is dedicated to the women voters who are interested and who will do much for good morals, good health, and good living, and is prepared because the author's experience has emphasized the fact that many people who have become concerned in the suppression of vice and in its corollary, the reduction in the incidence of venereal disease, are quite ignorant of many of the necessary details essential to a successful attack.

The author is Director of the Bureau of Protective Physical Measures in the Pennsylvania State Health Department, a scientific assistant in the United States Public Health Service, and was at one time United States Navy Law Enforcement Representative and an agent of the United States Department of Justice. He, therefore, has had many opportunities to study this matter at close range.

The book is a small one, covering less than 200 pages, printed in large type, heavily leaded, and might readily have been made much smaller from a printing point of view. It contains eleven chapters, discussing Prostitution and its Causes and its Manifestations; the Business Side of Prostitution and its Results; the Efforts made by the Government Against it, and the Medical Measures which have been Introduced, combined with law enforcement. In the eighth chapter the author deals with Medico-Legal Measures; in the ninth with Education; in the tenth with Welfare and Rehabilitation; and in the eleventh with what he calls Good Government, which is a somewhat ambiguous phrase for a brief chapter of eight pages, which deals with matters which are scarcely governmental.

As an agency for impressing upon women, who are now becoming active in political matters, the importance of helping fallen women and preventing the spread of venereal disease, we have no doubt that it will prove most useful.

HEART DISEASE AND PREGNANCY. By Sir James Mackenzie, M.D., F.R.C.P., F.R.S. The Oxford University Press, New York, 1921.

We learn from the preface of this little volume of less than 150 pages that Sir James was instigated to the preparation of it by reason of the fact that at a comparatively recent meeting of a medical society an obstetric physician read a paper on "Obstetrics Complicated by Heart Disease," and to his surprise made no reference to the great advances that had been made in cardiology in recent years, and instead adhered to an attitude which represented the subject fifty years ago. To his still greater surprise he found that on referring to a number of text-books on obstetrics the same lack of knowledge seemed to exist on the part of the authors, and so he felt it incumbent upon him to do something to bring to many suffering women the benefits of modern information. It is interesting to note that Sir James had a large obstetric experience, kept careful notes, and in the preparation of this book he has employed not only his newer views, but has turned back to a study of those notes of his earlier days that he might compare his old experiences with the newer knowledge.

The book is divided into sixteen chapters, dealing with the normal changes in the maternal circulation during pregnancy, confinement, and the puerperium; the changes in the diseased heart in pregnancy; the law of heart failure; murmurs in their various forms; cardiac irregularities; auricular fibrillation; and an important chapter, although brief, upon the neurotic heart. There is also a very brief chapter upon congenital defects of the heart in pregnancy, and another one upon the management of cases of pregnancy with heart disease, which covers only four pages, which we think might have been increased in scope with notable advantage. We note with interest that he reasserts his belief that medical treatment by drugs and the digitalis group is not satisfactory unless auricular fibrillation is present. As we have pointed out on previous occasions, this view limits the value of digitalis as a drug solely to its influence upon the transmission of impulses, whereas we believe it to be the most valuable tonic, stimulant and supportant of a heart in many conditions in which this organ is feeble, either as the result of overaction, in an attempt to compensate a leaking valve, or because of other conditions which have impaired its nutrition.